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Joining the dots:

**A framework for assessing integration in
Flood Risk Management with applications to
England and Serbia**

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A thesis submitted to Middlesex University in partial fulfilment of the
requirements for the degree of Doctor of Philosophy

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Thesis Abstract

Over decades the concept of integration has been promoted to enhance alignment between policy domains and to manage trade-offs and maximise synergies across management practices. Integrated approaches have the potential to enable better outcomes for Flood Risk Management (FRM) and society as a whole. However, achieving integration in practice is a recurring challenge, especially for FRM where multiple actors need to work together across fragmented policy domains. To further advance the concept of integration, this thesis develops and applies a framework for assessing integration in FRM and identifying different degrees of integration. The framework sets out the context of integration, assesses the governance capacity for integration through the strength of relationships between different types of actors (bridging, bonding and linking) and the mechanisms (actor-, rule- and resource-based) that influence them, and the realisation of integration in FRM practice through knowledge, policies and interventions. The framework is applied to different FRM integration challenges in England and Serbia using data collected from in-depth interviews with FRM professionals (n=73), participant observation at FRM related meetings (n=27) and document analysis at national, regional and local levels. The findings demonstrate the dynamic nature of achieving integration in FRM and how degrees of integration can evolve for different integration challenges in FRM and progress at various speeds. The research demonstrates the need to create a culture of collaboration and continuous learning within and across FRM and sector-specific organisations to realise integration in FRM through multiple mechanisms. Five types of boundary spanning roles were identified (reticulist, entrepreneur, interpreter, organiser and specialist) that facilitate actors' ability to work within existing mechanisms (e.g. rules, funding mechanisms and partnerships) to jointly develop knowledge and capture opportunities across sectors to realise integration in practice. Creating such a cultural shift that enables integration in FRM requires sustained resources, such as joint funds to generate and maintain such boundary spanning roles, as well as associated partnerships and training programmes, and appropriately designed rules in the long-term. Overall, the framework can be applied by researchers, policymakers and practitioners to facilitate a better understanding of integration in FRM and support its realisation.

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Abbreviations

ADA	Association of Drainage Authorities
ADEPT	Association of Directors of Environment, Economy, Planning and Transport
AMP	Asset Management Plan
AWS	Anglian Water Services
CA	Combined Authority
CaBA	Catchment Based Approach
CAP	Common Agricultural Policy
CCA	Civil Contingencies Act
CIL	Community Infrastructure Levy
CIRIA	Construction Industry Research and Information Association
CIWEM	Chartered Institute of Water and Environmental Management
CP	Catchment Partnership
CPC	Civil Protection Commissioners
CPD	Continuous Professional Development
DEFRA	Department for Environment, Food and Rural Affairs
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EA	Environment Agency
EM	Emergency Management
EPI	Environmental Policy Integration
ESIF	European Structural Investment Funds
EWS	Early Warning System
FCERM	Flood and Coastal Erosion Risk Management
FRM	Flood Risk Management
FWMA	Flood and Water Management Act
IDB	Internal Drainage Board
IFRM	Integrated Flood Risk Management
LEP	Local Enterprise Partnership
LES	Law on Emergency Situations
LLFA	Lead Local Flood Authority
LPA	Local Planning Authority
LRF	Local Resilience Forum
MAFP	Multi Agency Flood Plan
MHCLG	Ministry for Housing Communities and Local Government

NFM	Natural Flood Management
NPPF	National Planning Policy Framework
OECD	Organisation for Economic Co-operation and Development
OFWAT	Government Office for Water Regulation
PAA	Policy Arrangements Approach
PACM	Partnership Approach to Catchment Management
PIMO	Public Investment Management Office
PLR	Property Level Resilience
PSCA	Public Sector Cooperation Agreements
PSO	Partnership and Strategic Overview
PUC	Public Utility Companies
PWMC	Public Water Management Companies
RBLP	River Basin Liaison Panels
RBM	River Basin Management
RFCC	Regional Flood and Coastal Committee
RMA	Risk Management Authority
RMHSS	Republic Hydro-meteorological Service of Serbia
SEM	Sector for Emergency Management
SFRA	Strategic Flood Risk Assessments
SuDS	Sustainable Drainage Systems
SWMP	Surface Water Management plan
UL	Urban Landscaping Public Firm
UNDP	United Nations Development Programme
WFD	Water Framework Directive
WYCA	West Yorkshire Combined Authority

Glossary of terms

Alignment	The coherence and/or consistency between two things. Alignment is used in the context of this research in relation to aligning mind-sets and plans between actors.
Emergency management	Managing the preparation, response and recovery to a situation or series of events that threatens or causes serious damage to human welfare, the environment or security (e.g. adverse weather, severe flooding, animal diseases, terrorist incident) (Civil Contingencies Act 2004).
Flood risk management	The continuous analysis and assessment of flood risk to generate knowledge, develop plans and implement interventions to manage flood risk.
Integration	The degree to which the governance capacity (actor-relationships and influencing mechanisms) realises joint knowledge, aligned policies and synergies and/or efficiencies across interventions for FRM in practice.
Intervention	A planned activity designed to effect an improvement in an existing natural or engineered system (including social, organisation/defence systems) (Samuels and Gouldby 2009).
Mechanism	Any actor-, rule- or resource-based arrangement that influences the governance capacity.
Policies	In the context of the framework proposed in this research, policies are viewed as ranging from plans with different boundaries (e.g. geographical, administrative or catchment) or programmes of planned work.
Risk Management Authority	Organisations that have a key role in flood and coastal erosion risk management as defined by the Flood and Water Management Act. These are the Environment Agency, lead local flood authorities, district councils where there is no unitary authority, internal drainage boards, water companies and highways authorities.

Chapter 1 Introduction

This chapter sets the overall rationale for this study by introducing the use of integration as a concept across Flood Risk Management research, policy and practice. The research gap is then demonstrated, and the research questions addressed in this study are outlined. This chapter ends by discussing the research approach taken to answer the outlined research questions and explains how the thesis is structured.

1.1 Flood risk management: the need for integration

The impact of devastating floods on lives and livelihoods is growing globally. Large scale floods caused 104 billion US\$ in damages between 2000 and 2015 globally (UNISDR 2015a). At a European level, low-frequency, high-impact flood events have demonstrated extensive social and economic impacts on large cities and countries across Europe, such as winter floods in England (2019), West Balkan floods (impacting Serbia and Bosnia and Herzegovina in 2014), and European Elbe floods (impacting Germany, Czech Republic and others, 2013). With climate change on the horizon, populations growing with increasing demand for housing and infrastructure, now more than ever, society needs to manage its flood risk and adapt to climate change. For this reason, achieving Flood Risk Management (FRM) in a way that is effective, efficient and sustainable is gaining more significance and urgency within research, policy and practice (Hall et al. 2003, Klijn and Schweckendiek 2012, APFM 2017).

FRM in the context of this research is defined as the continuous analysis and assessment of flood risk to generate knowledge, develop plans and implement interventions to manage flood risk. This broadly aligns with definitions from Floodsite (Samuels and Gouldby 2009) and the EU Floods Directive (European Union 2007). It is broadly agreed that achieving ‘good’ FRM requires an understanding of whole-system behaviour and societal goals, utilises risk knowledge, accounts for uncertainty and implements a diverse mix of measures

and policy instruments (Sayers et al. 2013). Furthermore, FRM should support society to develop sustainably to reduce the negative impacts of flooding on people, economies and the environment (Hooijer et al. 2004, de Bruijn et al. 2008). This view of FRM is commonly intertwined with the concept of integration because understanding the whole system requires interaction with wider sectors and management practices, such as environment, water resources, land/agriculture, and infrastructure management within or cutting across river basins. This need for a cross-sectoral approach led to the emergence of the concept of ‘integrated flood risk management’ and is used regularly within research and practice. The terminology has undergone several iterations since the 1990s, prominent perspectives being from Integrated Flood Management in the WMO Concept Paper (Grabs et al. 2007, WMO 2009), integrated FRM within the Floodsite Project (Samuels et al. 2010) and towards comprehensive FRM (Klijn and Schweckendiek 2012). Overall, there is a clear intention to move from flood management to FRM across Europe as a result of the Floods Directive (2007/60/EC) (Klijn et al. 2008). Within this thesis it is argued that use of the term ‘integration’ within the context of FRM is often tangled up with ‘good’ FRM, thus the unique characteristics and meaning of integration can get diluted, overlooked or merged with others.

Conversely, outside of the domain of FRM, the term ‘integration’ is used regularly especially across governance and policy development related literature (Jacob et al. 2008, Candel and Biesbroek 2016, Russel et al. 2018). The need for policy integration is promoted because often policies contradict one another or one policy makes another one very difficult to achieve (Lyall and Tait 2004). Furthermore, policy integration is advocated for managing cross-cutting issues and to ensure cross-sectoral collaboration based on shared priorities and aligned sectoral objectives to overarching higher goals (Underdal 1980, OECD 2018b). Furthermore, a variety of different policy arrangements (Arts et al. 2006), instruments and mechanisms (Gilissen et al. 2015, Candel and Biesbroek 2016) are recommended to increase the governance capacity for integration (Koop et al. 2017). However, policy integration has been criticised because it led to less tangible results for integration in practice than desired (Jordan and Lenschow 2010, van Herk et al. 2015).

Integration for FRM is difficult to translate in practice for many reasons. For example, the ingrained culture of working in ‘silos’ that persists across many governance regimes (Renn et al. 2011, Pahl-Wostl et al. 2013), in combination with scattered responsibility for FRM across different organisations (Vinke-de Kruijf et al. 2015, Dieperink et al. 2016) with

sometimes blurry boundaries (Walker et al. 2014). These actors include many public-sector ministries and authorities, many private sector organisations e.g. utility companies, engineering consultants, insurance companies, and civil society actors such as NGOs and local residents. Therefore, strong coordination mechanisms between actors is a growing fundamental requirement for FRM (Gilissen et al. 2015). These relationships between actors and their influencing mechanisms can be framed as the governance capacity for integration in FRM, as used by Koop et al. (2017) in the context of water governance (further explained in Section 2.2).

FRM is growing in complexity, whereby a more diverse mix of FRM strategies are being advocated, alongside the recognition that FRM requires collaboration with other sectors (e.g. environment, transport, housing) to manage flood risk in a sustainable, effective and efficient way. With the abundance of opportunities to realise integration in practice within and across sectors, it makes it difficult for practitioners and policymakers to know where to start in such a complex system. To capture these two-way synergies between FRM and sector-specific goals, different discourses have emerged within research or pilot projects and policies. Sometimes FRM is the core focus of projects/discourse, for example, Green Blue Infrastructure cutting across infrastructure, environment and water management sectors (Ashley et al. 2013, Lawson et al. 2014, Meerow and Newell 2017). In other discourses, such as adaptive Delta Management in the Netherlands (Gersonius et al. 2016) integration with FRM is considered to be embedded within. By looking across sectors, many benefits can also be captured for FRM, to make it more effective (e.g. reducing the risk by implementing upstream catchment management and downstream protection measures), efficient (e.g. saving time and money by using resources from other actors), acceptable (e.g. creating an amenity area or wetland restoration alongside flood scheme) and/or sustainable (e.g. ensuring long term maintenance of interventions/assets with landowners). However, often receiving less attention are the benefits for sector specific goals, for example economic growth of a deprived area or increased biodiversity and regeneration of ecosystems (Tanner and Rentschler 2015).

Altogether this creates a complex picture for integration in the context of FRM which is much wider than the so-called ‘integrated’ FRM. In such a way, opportunities for integration in FRM can be captured within or weaved across the existing discourses and policy domains. Taking this into account, some degree of integration is desirable but presents a complex challenge to both understand, assess and introduce in the context of FRM. Different degrees

of integration, for example, as identified for policy integration (Candel and Biesbroek 2016), are expected to be achievable in FRM. This is likely to depend on the flood governance context; the distribution of actors across policy domains and their associated roles and responsibilities, the sources of flood risk, and the socio-economic system.

1.2 Problem identification

Considering the arguments made above, this research draws emphasis on the need to think beyond traditional or emerging ‘buzz’ words or phrases surrounding integration. As such it highlights the need to recognise the deeper functional meaning behind integration in the context of FRM, be that within FRM or across different sectoral management perspectives. Despite the widespread application of the concept of integration, its meaning has varied interpretations. Overall, there is a lot of literature on integration, derived from different domains (e.g. governance, policy, environmental management). However, here a critical gap identified is the lack of approaches to assess integration considering both the FRM and sector-specific perspectives. Therefore, it is argued that integration in the context of FRM requires in-depth research to connect the use of the term integration in a wider sense than commonly used within management practices and more specifically than used in the policy/governance domain. For this reason, approaches to assess and understand the components of integration are needed. In such a way, this can allow for a deeper meaning of integration and the specific requirements needed to improve different underlying mechanisms influencing the degree to which integration is realised in practice for FRM.

A variety of actions will influence the degree of integration in FRM, either knowingly or not, such as new policies, or funding mechanisms. However, they may target a specific element of integration e.g. knowledge development or a multi-benefit FRM scheme, yet their enabling or hindering effect on other aspects of integration, such as the actor relationships may not be clear. Therefore, an approach is needed to take a wide view on the elements of integration and how they interact to influence integration capacity and its implementation in practice. However, there is no method available to analyse different degrees of integration and provide guidance on where and how to improve it in the context of FRM. Furthermore, there is limited guidance to identify how the governance capacity for integration between actors across sectors influences the realisation of integration in practice. In addition, this suggests the need for a deeper theoretical conceptualisation of integration

that can critically analyse the dynamics between the governance capacity for, and the realisation of, integration in practice. This research aims to address these gaps.

1.3 Research context and scope

This research is conducted in the European context with case-studies from two countries, England and Serbia, each experiencing their constraints and enablers in achieving FRM, as well as their desire to achieve integration. Chapter 3 (Section 3.1.3) explains the justification of the selection of the cases.

Although this research is focused on integration in the context of FRM, it is recognised that many aspects are comparable to other cross-sectoral governance challenges (e.g. water resource management, climate change adaptation). Therefore, much of the literature and conceptual grounding used within the research emerged from integration applied to other policy contexts. This research does focus on the role of professionals with a direct or indirect role in FRM and is thus not focused at the community level. Additionally, the scope of the research is on flood risk from rivers and surface water, thus not including coastal or groundwater flood risk.

Furthermore, the research relates to both the flood policy context, driven from the European legislation Floods Directive (2007/60/EC), of particular importance within the English and Serbian context, and from international policies such as the Sendai Framework for Disaster Risk Reduction 2015 – 2030 (UNISDR 2015b), which gained more importance in the Serbian context. However, additionally, the importance of managing flood risk in combination with other objectives is gaining more significance across wider policy domains, such as the Sustainable Development Goals (United Nations 2015) and the Water Framework Directive (WFD; 2000/60/EC) and these are also recognised within the context of the research.

A broad view on integration and what it involves in research, policy and practice is taken within the research. A positive stance is taken on integration and the benefits it can deliver and the analysis delves into the barriers and challenges that can evolve through doing so.

1.4 Research aim and questions

This research aims to advance the **concept of integration in flood risk management theory, policy and practice** by developing and applying a framework for assessing integration.

The following **research questions (RQ)** are answered to achieve this aim:

1. What are the **different elements of integration** and how can they be assessed to understand the complexity of integration in FRM?
2. How can the assessment of these elements be used to identify **integration profiles** for different FRM integration challenges in different contexts?
3. How do the **mechanisms** in place enable or hinder **individuals'** ability to achieve integration in FRM and vice versa?
4. How can different **degrees of integration** in FRM be characterised and what guidance can actors follow on a journey to achieve their desired¹ degree of integration in FRM?

These research questions connect through the development of a framework to assess integration in FRM (RQ1) and its application to generate multiple integration profiles (RQ2) to characterise different degrees of integration (RQ4). In addition, delving deeper into specific aspects of the framework provides additional insight into achieving integration in FRM (RQ3). By answering these research questions, the framework is expected to:

- Advance the **theoretical** conceptualisation of integration in FRM;
- Support the development of more informed **policies** that facilitate integration, such as national plans or regulations that influence FRM locally and regionally;
- Help identify opportunities for enabling integration in **practice** for FRM, such as generating joint knowledge and capturing synergies across FRM and sector-specific interventions.

¹ Using the term 'desired' attempts to recognise that the highest degree of integration is not achievable in all governance contexts.

1.5 Thesis approach and structure

A qualitative approach was taken to answer the research questions in this thesis, as presented in Figure 1-1. A literature review was undertaken to conceptually understand different meanings of integration and to identify the key elements of integration and associated indicators, the results of which are presented in Chapter 2. These elements and indicators were then iteratively refined based on the data collected through interviews and participant observation primarily the English case and updated based on the Serbia case. Combining these insights from the data and the literature, the assessment framework is presented in Chapter 4, thus answering research question 1.

This framework is then applied in Chapter 5 for different integration challenges for FRM in England and used to identify the associated integration profiles. Similarly, the framework is applied in Chapter 6 using the data collected from the interviews to a different geographical and cultural context in Serbia. The insights gained from the application of the framework into the intertwined nature of the elements of integration and the barriers and enablers for integration are described within both Chapter 5 and Chapter 6. Together the results presented in Chapter 5 and 6 answer research question 2.

Chapter 7 delves into a key theme that emerged from both applications of the framework. This relates to the balance and interplay between individual agency and the governance mechanisms through which individuals operate, and how that influences integration in FRM, both positively and negatively. This chapter presents the relevant findings from both cases and answers research question 3.

Chapter 8 begins by combining the analysis from the different integration profiles, to characterise four different degrees of integration. Furthermore, a guideline is developed to support the application of the framework in policy and practice. Additionally, Chapter 8 utilises the findings and insights from the answering of research questions 1 to 3 to develop applied lessons targeted to policymakers and practitioners on a journey towards integration in FRM. Together these insights aim to offer a simple means to condense both the theoretical and empirical findings from the research to ensure its practical uptake, thus answering research question 4.

Chapter 9 concludes this thesis by reiterating the contributions to knowledge for each research question. It ends by highlighting the key limitations of the research and scoping for areas that require further research based on the insights generated through this thesis.

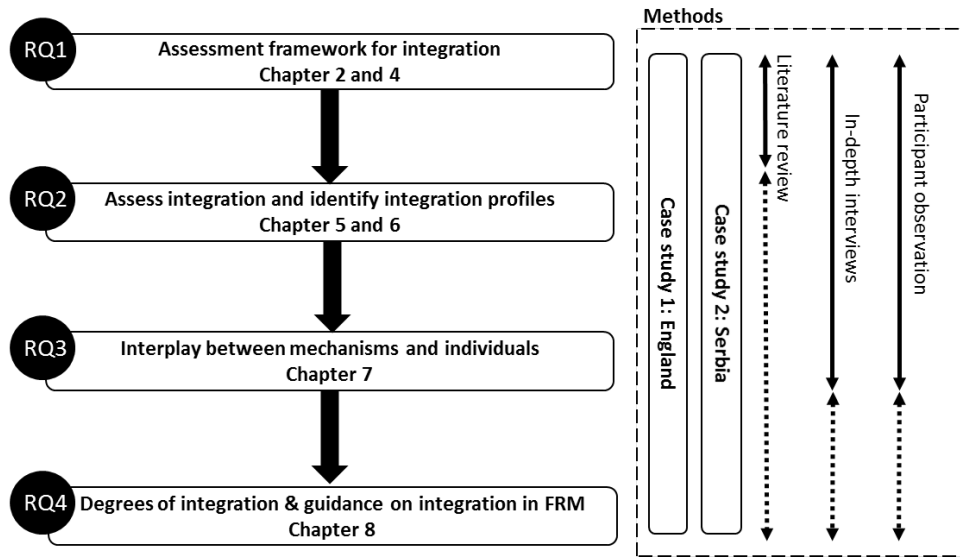


Figure 1-1 Overall research approach (RQ = research question)

Chapter 2 Identifying a means to assess integration in flood risk management

This chapter provides critical reflection on the concept of integration both from theoretical and practical perspectives. Based on the literature in the context of FRM and other policy domains, this chapter breaks down the complexity of integration by identifying the key dimensions and elements of integration. This sets out the structure of the framework for assessing integration proposed in this research, which is then further detailed in Chapter 4 with the help of evidence on FRM in England. Here the aim is to restructure existing literature across domains and piece it together in a way that can bring more insight into the concept of integration and the best means to assess it for FRM. Furthermore, the literature is used to conceptualise the interaction and connectivity between the identified dimensions and elements of integration, and to justify the need to characterise different degrees of integration.

2.1 Complexity of integration in flood risk management

A thorough understanding of the complexity of actually achieving integration, both in theory and practice, is not yet complete (Kidd and Shaw 2007). Integration is promoted across many policy domains, to enable joint action between actors, across sectors and spatial boundaries to account for interdependencies, capture synergies and reduce conflicts across cross-cutting goals (Persson 2004, Kidd and Shaw 2007, OECD 2015a). This is especially true for more ‘wicked problems’, those complex policy problems subject to uncertainty, involving multiple actors with often diverging interests (Head 2008). The following are examples: adapting to climate change and reducing disaster risk (Forino et al. 2015), urban/spatial planning (Eggenberger and Partidário 2000, van Herk et al. 2011), or achieving sustainable development (Persson 2004, Stafford-Smith et al. 2017). Flood Risk Management (FRM) can also be identified as a wicked problem as it involves multiple

actors across sectors and levels of decision-making and multiple sources of flood risk (WMO 2009, Samuels et al. 2010). Within this research it is argued that integration is a means to solving such wicked problems, not an end goal in itself.

Integration is a term used frequently in policy and practice, however, often in different ways. From management perspectives, integration is advocated, but there is not yet a generally accepted definition of integrated flood risk management (IFRM). The World Meteorological Organisation (WMO) defines the goal of integrated flood management (IFM) as minimising the loss of life from flooding while maximising the net benefits from using floodplains, recognising the dynamic system of the whole river basin, interaction with land and water management, the need for a mix of FRM measures, and the inclusion of all relevant actors (WMO 2009). The use of integration in the context of FRM can be mixed up with the general characteristics of FRM (e.g. using a mix of measures) rather than emphasising the actual meaning and characteristics behind integration e.g. capturing additional synergies and managing trade-offs/conflicts across sectors. For example, O'Neill (2018) uses the term integrated FRM but draws on more general principles of FRM, such as public participation and using a diverse mix of measures, with less focus on synergies and trade-offs across sectors. Furthermore, the term is often used casually, such as being stuck onto reports or research to increase their appeal without specifying the added value of enabling integration e.g. Park et al. (2013). Additionally, integration has been used to describe connections between science and policy (van den Hove 2007), social and technical perspectives (Brown and Damery 2002), or different modelling tools (Anselmo et al. 1996). This demonstrates the various ways that integration can and is being used or interpreted in research and practice.

In such a way, given all the approaches to using integration, it has positioned itself to be quite a complicated term to grasp both in policy and practice. This raises the challenge of 'where to start' to define and assess such a multifaceted concept. Within this research it is proposed that achieving integration in the context of FRM is defined as: "the degree to which the governance capacity (actor-relationships and influencing mechanisms) realises joint knowledge, aligned policies and synergies and/or efficiencies across interventions for FRM in practice". The terms used within this definition are further explained herein.

Although the demand for integration is increasing, understanding the varied ways integration can be achieved in policy and/or practice are dispersed across the literature. Firstly, achieving integration or joint action across actors requires sufficient governance capacity between actors and the mechanisms they use to work together (Arts and Goverde 2006, Emerson et al. 2012, Dang et al. 2016, Koop et al. 2017). Koop et al. (2017 p. 3430) identify the water governance capacity as “*the key set of governance conditions that should be developed to enable change*” for water governance challenges. Therefore, the governance capacity reflects the ability for actors to be able to manage governance challenges to achieve the desired outcome, such as integration in FRM. This framing emphasises the need for institutions to have sufficient mechanisms or instruments in place for coordination and collaboration (Gilissen et al. 2015, Candel and Biesbroek 2016, Dang et al. 2016), thus to enable effective change. However, attempts to achieve integration often fail due to barriers and challenges embedded within the governance system (Stead and Meijers 2009, Williams and Sullivan 2009). Examples are as follows: the time-consuming nature of making decisions across multiple actors and committing time to understand different actor perspectives, legal arrangements and funding sources presents difficulties (Surridge and Harris 2007, Stead and Meijers 2009, Williams and Sullivan 2009, Walker et al. 2014). Additionally, the need for integration to ensure coordination procedures, fit between scales and better linkages between levels to account for the often blurred responsibility boundaries (Surridge and Harris 2007, Walker et al. 2014) is dominant in much of the governance literature (Cash et al. 2006, Ostrom 2009). However, in practice, the scale misalignment, costs of coordination and difficulties to address interdependencies make it challenging to achieve (Termeer et al. 2010).

There is a ‘shift in governance’ from government to governance (Taylor 2007) moving away from hierarchal and top-down forms of government towards more collaborative forms of governance e.g. collaborative governance (Ansell and Gash 2007, Emerson et al. 2012), multi-level governance (Pierre and Peters 2000, Newig and Fritsch 2009, Lidskog et al. 2011), polycentric governance (Ostrom 2009), network governance (Rhodes 2007) and integrative governance (Klinke and Renn 2012). These new forms of governance present opportunities for integration because they support more interaction between actors, which can subsequently facilitate additional joint outcomes. Furthermore, the move from centralised to decentralised governance regimes can make it more feasible to integrate local priorities across sectors locally (Christensen 2012). For example, a nationally-led

coordination approach to implementing the EU Floods Directive in Sweden resulted in flood risk not being seen as a cross-sectoral issue (Johannessen and Granit 2015). Therefore, this shift is still ongoing and challenges to transition to such collaborative integrated approaches across sectors persist. Local resistances and challenges have been reported in European countries (Huiteima and Meijerink 2010, Menzel and Buchecker 2013, van Herk et al. 2015). The reasons identified included the inconsistency with the existing institutional structures (Huiteima and Meijerink 2010), cultural tensions and ‘collaboration fear’ for professionals more familiar with sectoral approaches (Kolkman et al. 2005, Wilkinson et al. 2017), difficulties to enable participation from multiple actors (Challies et al. 2016, Buchecker et al. 2016) and a lack of knowledge on the effectiveness of new approaches. Integration is often seen in a negative light because it demands personal commitment to doing things differently (Termeer et al. 2010). Therefore, understanding the governance capacity for integration is important in identifying the potential for integration in FRM.

Global, regional and national policy efforts exist (e.g. EU Floods Directive) that encourage integration in practice because it can realise outcomes for multiple actors quicker and at a lower cost (Lyall and Tait 2004), thus generating ‘collaborative advantage’ (Vangen and Huxham 2003). There is a growing awareness that policies cannot achieve their desired outcomes because of unaligned actions of other actors or because of conflicts between policies (Lyall and Tait 2004). It is challenging for actors to balance their multiple overlapping objectives and interests to achieve the desired outcome, such as integration in FRM (Underdal 1980, Stead 2008, Candel and Biesbroek 2016). An integrated approach can work towards achieving joint outcomes for FRM across multiple domains and their associated knowledge, policies and interventions – thus capturing additional benefits across these sectors than if completed alone (Huxham 2003). An example of this is aligning interventions between infrastructure and FRM to gain additional benefits for the environment and FRM (Lawson et al. 2014). Additionally, benefits of integration can come in the form of new or more efficiently generated knowledge taking a wider multi-actor perspective, for example as identified for water management (Ridder et al. 2005). However, it is often the case that realising integration stops at the policy level and does not translate to action on the ground (van Herk 2014). This was identified for the case of environmental policy issues in OECD countries where integration was found to be well placed in policy and associated instruments, however, the operationalisation of these plans was limited (Jordan and Lenschow 2010). Therefore, the benefits of integration are clear ‘on paper’

however, the extent to which integration is realised in FRM practice forms an important aspect of its assessment.

Considering the points raised above, the position taken in this research is that achieving integration is desirable because it can capture synergies across cross-cutting goals and manage diverging actor interests. Achieving integration does not undermine the necessity of having focused sectoral institutions. Instead it establishes the best ways to facilitate bridges and links between actors, their governing mechanisms, policies and interventions to achieve joint outcomes for FRM alongside other sectoral objectives. However, as highlighted above, it is not easy to achieve integration successfully and some attempts may lead to negative consequences or undesirable outcomes, such as a lack of consensus, increased costs or a lack of joint results. Additionally, attempts to enable integration, such as the reorganisation of institutions can fail to support integration on the ground because underlying governance issues persist e.g. funding allocation and/or staff training (Stead and de Jong 2006). Furthermore, failed pilot projects aimed at achieving integration are often not evaluated (Francesch-Huidobro et al. 2017). A lack of critical analysis limits the ability to learn about critical barriers for achieving integration as well as capturing the negative consequences of attempts to integrate. Therefore, it is important that the mechanisms and processes that led to undesirable outcomes are dissected and understood to learn for future attempts, instead of labelling the expected but often unaccomplished result – integration – as necessarily being ‘bad’.

A broad understanding of integration is used within this research to capture all the elements that influence its achievement. Therefore, a framework is needed to distinguish and assess the key elements of integration that build governance capacity and deliver integration in practice for FRM. There are theories and associated literature from a wide variety of fields of study that can help to identify these key elements and a means to assess them. The governance literature offers a grounded approach to look at integration from multiple disciplines whereas the realisation of integration draws more specifically on the FRM literature from a practical perspective. The following sections explore the relevant theory and literature that are drawn upon and discusses why such information was, or was not, selected for use within the framework developed in this study.

2.2 Governance capacity for integration in flood risk management

Governance is widely interpreted as the process of jointly working together to develop policies and implement them, rather than as an output itself (Kooiman 1993). Enabling integration in FRM requires a governance approach that supports it, such as the ‘new modes of governance’ as introduced in Section 2.1. Governance has evolved from fields of environmental and water policy, climate adaptation, disaster resilience, and public administration. This includes a sector/problem specific focus e.g. flood risk governance (Alexander et al. 2016) or risk governance (Renn 2008). The need to engage multiple actors across different levels is also the focus across much of the governance literature e.g. collaborative governance (Ansell and Gash 2007, Emerson et al. 2012), multi-level governance (Pierre and Peters 2000, Newig and Fritsch 2009, Lidskog et al. 2011). Furthermore, emphasis is often placed on the need for change e.g. anticipatory governance and adaptive governance (Rijke et al. 2012). Additionally, integration is commonly used in governance literature whereby the focus is on the need to integrate different perspectives. Examples are as follows: the integration of climate change adaptation, sustainable development, and disaster governance into so-called adaptive and integrated risk governance (Klinke and Renn 2012), adaptive and integrated disaster resilience (Djalante et al. 2013) or integrated disaster risk governance (Shi 2012). Furthermore, the need for governance drove further management approaches that emphasise the need to coordinate across multiple sectors and organisations to solve problems that cannot be managed in isolation e.g. collaborative public management (McGuire 2006), post-New Public Management (Christensen 2012), and network management (Agranoff and McGuire 2003).

Overall, it can be seen that integration is interspersed throughout much of this governance literature in different ways. Therefore, instead of focusing on one of the many governance approaches, the Policy Arrangements Approach (PAA) which stems from institutional dynamics in environmental governance and is rooted in the new modes of governance literature e.g. network governance (Arts et al. 2006), was identified as a useful means to frame the governance capacity in this research. A policy arrangement is the “*temporary stabilisation of the content and organisation of a particular policy domain*” (van Tatenhove et al. 2000 p. 54). The tetrahedron, as shown in Figure 2-1, ‘revolves’ due to the dynamics and interactions between each dimension - actors, rules, resources and discourses (Lieverink 2006). These are “*inextricably interwoven*” whereby the shaping and structuring

of a policy arrangement in terms of content and organisation is in continual flux (Liefverink 2006 p. 48).

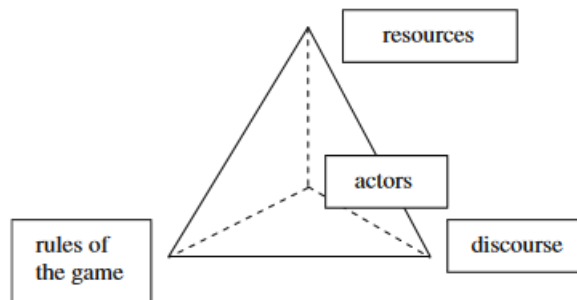


Figure 2-1 A tetrahedron symbolising connections between dimensions of policy arrangements (Arts et al. 2006)

The PAA has also been linked to governance capacity whereby understanding the governance capacity helps to frame an assessment of the ability for the governance systems in place to successfully diminish or solve societal and administrative problems (Arts and Goverde 2006), or in this case to realise integration in practice. The PAA emphasises the role of actors along with the rules and resources that influence them. Similarly, the intensity of the interactions between actors and the influence of mechanisms (such as rules and resources) e.g. policy instruments (Stead 2008, Jordan and Lenschow 2010, Candel and Biesbroek 2016) or bridging mechanisms (Gilissen et al. 2015) represents a common thread identified across both the policy integration and governance literature (Ansell and Gash 2007, Emerson et al. 2012). Furthermore, the PAA approach captures the influence of actors to continuously adapt or influence these policy arrangements – connecting with the literature on structure-agency interplay (Giddens 1984). In addition, the PAA offered a useful means to identify the flood risk governance arrangements across Europe (Alexander et al. 2015, Dieperink et al. 2016).

Although the PAA is not specific to integration or FRM, it captures the dynamic and continuous nature of the governance capacity which fits well in the line of this research. The key elements of the governance capacity for integration are identified as being fundamentally related to understanding the actor relationships and the mechanisms that influence them (or that they influence). The following sections build upon additional surrounding literature and theory to further distinguish each of the elements of governance capacity.

2.2.1 Actor relationships

Understanding the relationships between actors and their governance arrangements has formed a central part of the literature surrounding integration. Many methods or approaches have evolved to identify and analyse the relationships between actors in different levels of detail. Social Network Analysis (SNA) presents a detailed analysis method used to investigate the strength of relationships between stakeholders through nodes (i.e. actors) and links (i.e. relationships) that connect the nodes (Scott 1998). Granovetter (1973) uses attributes to classify the strength of the relationship: time, emotional intensity, mutual confiding and reciprocal services - whereby the higher a relationship scores on each of these attributes, the stronger the relationship is. Breaking down these attributes, additional literature is found to present similar characteristics when understanding the relationships between actors.

Firstly, studies show that the way the different actors perceive or frame the problem (causal beliefs, cognitions or frames of reference) and their values (norms, interests and purposes) will influence their ability to work together (Underdal 1980, Keast et al. 2007, McNamara 2012, Thissen and Walker 2012, Candel and Biesbroek 2016). Hermans and Thissen (2008) identify four approaches to actor analysis: networks (limited by institutional contexts and rules), perceptions (causal beliefs, cognitions or frames of reference), values (norms, interests and purposes) and resources (related to power and influence). Some scholars assume that actors' interests are often embedded in a frame of reference or set of ideas *"which pre-structures the thinking within a policy sector, influencing the way they perceive policy problems"* (Lenschow 2002 p. 17). Within the PAA, the relationships between actors develop into stable patterns whereby the problem understanding and willingness to 'give and take' evolves between actors (Lieverink 2006). Conflicts between actors can emerge when there is misalignment between how they frame the problem and their interests in how it is managed. Social learning (further discussed in Section 2.3.1) is identified as a popular approach to building actor relationships through analysing frames and facilitating reframing between actors to manage conflicts (Mostert et al. 2008). Furthermore, it can develop a shared sense of purpose reinforcing shared motivation and capacity for joint action (Emerson et al. 2012). Interaction between actors also helps to build shared understanding where actors agree on a shared set of values or goals (Ansell and Gash 2007) or mutual understanding to *"understand and respect each other's positions even when one might not agree"* (Emerson et al. 2012 p. 14). The thinking on relationships between organisations

Table 2-1 summarises the key points from both frameworks, whereby a trade-off emerges as you move through the continuum. More intense interactions require more time to develop collaborative efforts to support improved relationships and results between actors.

Table 2-1 Comparison between cooperation, coordination and collaboration (Keast et al. 2007, McNamara 2012)

Cooperation	Coordination	Collaboration
<ul style="list-style-type: none"> • Retain individual autonomy and resources • Separate goals • Take each other's goals into account and try to accommodate them • Short-term informal relations 	<ul style="list-style-type: none"> • Remain separate but contribute to a specific agreed program of actions • Do not require the loss of autonomy • More effort, commitment and formality required • Joint planning and possibly joint funding • Structured mechanisms/ strictly managed processes • Drive a specific outcome or result quite firmly • Known, comfortable and controllable • Shared benefits and shared risks 	<ul style="list-style-type: none"> • Focused on joint outcomes and shared goals – holistic perspective working towards system change • New terms of engagement and alternative structures and processes • Achieve greater efficiencies of scale and outcome • Closer relationships, trust, connections and resources • High levels of contribution, commitment and joint effort • Less clarity on the expected outcome/result • Innovation • Problems – sustaining and inefficiencies • Requires a shift in skills and culture • Leadership role of government • Stable and long term • Highest risk as there is a threat to autonomy

Furthermore, Stead (2008) developed a pyramid framework for integrated policy-making, see Figure 2-3. It provides a different approach to the 3Cs framework by removing collaboration and putting integration at the top of the pyramid. However, the framing of cooperation, coordination and collaboration (or integration) is not used in this thesis as the interpretation of the terms coordination and cooperation can confuse (McNamara 2012) and are used differently across the research. Instead, the focus is placed on the strength of the relationships which reflects the connectivity and intensity of the relationships, as proposed by Keast et al. (2007) and McNamara (2012). The level of connectedness between these actors, thus their ability to coordinate and/or collaborate, has been assessed by identifying the availability and strength of bridging mechanisms or policy instruments connecting actors (Stead 2008, Gilissen et al. 2015). Thus, the interaction between stakeholders can happen in many ways – these are discussed in Section 2.2.2. Furthermore, the term fragmented is not always used as the opposite to integration, therefore using a scale of the strength of the relationships from strong to weak is deemed more appropriate.



Figure 2-3 Integrated policy-making, policy coordination and cooperation (Stead 2008)

Next, different relationship types are distinguished to help group different types of actors and their relationship with other actors. Gitell and Vidal (1998) and Szreter and Wollock (2004) identify bonding, bridging and linking social capital, which offers a useful means to think about different types of relationships between actors in the context of integration in FRM. For relationships between actors focused on aligning internal objectives (such as FRM), they are expected to need more bonding relationships because they are similar in some form (Putnam, 2000). Therefore, bonding relationships distinguish the relationships between actors who have a formal mandate on FRM but are likely to be spread across different organisations. In comparison, bridging relationships represent those who are dissimilar in a demonstrable fashion (Szreter and Woolcock, 2004). Therefore, bridging relationships will be needed for connecting different sectoral interests e.g. infrastructure, environment with FRM. Linking relationships can connect individuals who have power over them across spatial levels and has been used to relate to the relationships between government and community representatives (Woolcock, 2001; Szreter and Woolcock, 2004). Therefore, in the context of FRM linking relationships can relate to the relationships between local authorities (or other FRM professionals) and communities but also linking between national and local FRM actors. Therefore, the key element ‘actor relationships’ is broken down into the bonding, bridging and linking actor relationships within this research to specifically help to categorise the actors in the context of assessing integration in FRM.

2.2.2 Influencing mechanisms

As introduced in Section 2.2, the governance capacity for integration will be positively or negatively influenced by the presence and strength of different mechanisms, thus influencing the strength of actor relationships, and vice versa (Stead 2008, Gilissen et al. 2015). These mechanisms are named and characterised differently across the literature.

Gilissen et al. (2015) focus on ‘bridging mechanisms’ and group them into 1) transfer mechanisms, to improve information/ experience exchange, 2) coordination mechanisms, to ensure one’s policy does not hinder another’s, and 3) cooperation mechanisms, to mutually work together towards achieving a goal. Stead (2008) classifies different examples of mechanisms into those influencing policy cooperation, policy coordination and policy integration. Candel and Biesbroek (2016) use the term ‘procedural instrument’ which facilitates coordination between subsystems and ensures consistency between the sets of instruments i.e. consideration of externalities. Both of these are somewhat aligning to the ‘3 Cs’ framework (Keast et al. 2007) presented in Section 2.2.1 and could help to categorise different types of mechanisms; however, for similar reasons given above these categories could be easily misinterpreted. Therefore, instead, the PAA offers a more straightforward means to categorise these influencing mechanisms on integration and is explained further herein.

As introduced in Section 2.2, the PAA distinguishes between the actors (and their coalitions), resources (a division of power and influence), rules of the game and discourses (views and narratives of actors involved) (Arts et al. 2006). Two of these dimensions – rules and resources - are deemed suitable to categorise the different types of influencing mechanisms as it relates to their functional purpose instead of what they are trying to achieve (e.g. coordination). Although the ‘actors’ dimension is covered in the actor relationships element (as discussed in Section 2.2.1), the actor related institutional and process-based mechanisms designed to increase the interaction between actors are not covered e.g. partnerships, reformed institutions. Therefore, this is added as an additional type of mechanism named ‘actor-based’, along with ‘rule-based’ and ‘resource-based’ in the context of this research assessing integration in FRM. Furthermore, discourses were not included as a type of mechanism because, although they can influence integration over time, they are less tangible than actors, rules and resources, and have to some extent been included in actor relationships. Similarly, Gilissen et al. (2015) measure the *degree of interconnectedness* between actors by the availability of *bridging mechanisms* that connect them. The *quality of this interconnectedness* is measured by the strength of these bridging mechanisms. Therefore, gaining a deeper understanding of the availability and quality of the actor-, rule- and resource-based mechanisms can help to identify the strength of the actor relationships and thus assess the governance capacity for integration. An overview of the

types of actor-, rule- and resource-based mechanisms is presented in Figure 2-4 and are further explained herein.

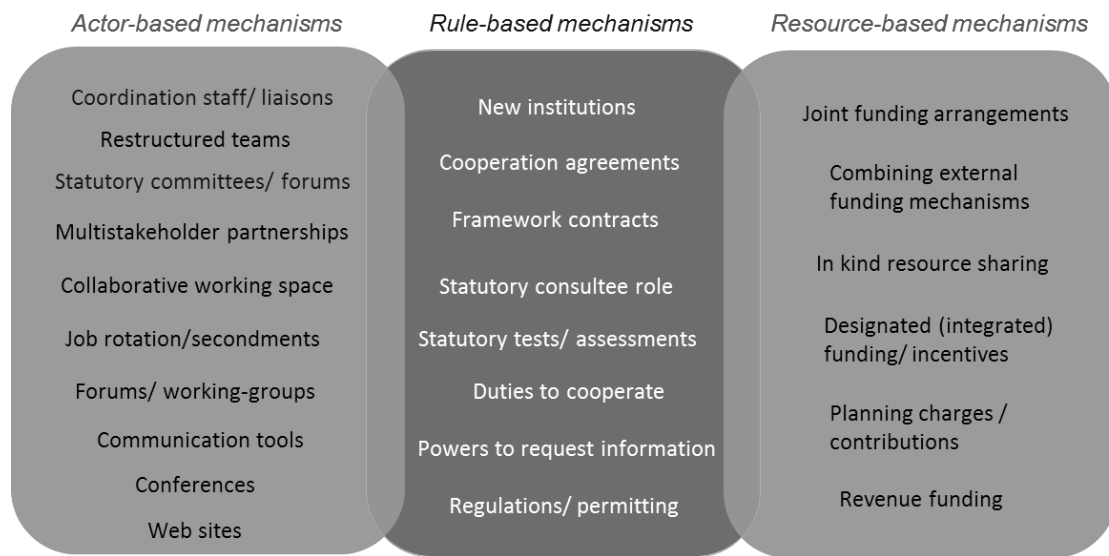


Figure 2-4 Overview of actor-, rule- and resource-based mechanisms

Actor-based mechanisms are identified as those that improve actors' interaction, communication and knowledge exchange. These include; inter-governmental committees, working groups or coordinating councils (Agranoff 2006, Stead 2008), multi-stakeholder partnerships or platforms (Pattberg and Widerberg 2016), conferences (Stead 2008), collaborative working arrangements (Stead 2008), human resource policies e.g. secondments or job rotation (Stead 2008), joint planning processes or working groups (Freude am Fluss 2007), cross-cutting units or interdepartmental teams (Stead 2008, Candel and Biesbroek 2016), and individual staff positions or coordinators e.g. boundary spanners (Williams 2002, Agranoff 2006). Cash et al. (2003) indicate that a variety of institutional mechanisms need to be applied to facilitate communication, translation and mediation across boundaries. In practice, networks tend to involve boundary organisations, an arena for actors to reach common understanding (Guston 2001), bridging organisations with broader scope of issues (Brown 1991) or epistemic communities, formal collaboration or co-management with different actors with similar interests (Folke et al. 2005). Partnerships are becoming a popular bridging mechanism to enable this collaboration and joint action. Multi-stakeholder platforms (MSP) are defined as “*decision making bodies (voluntary or statutory) comprising different stakeholders who perceive the same resource management problem, realise their interdependence for solving it, and come together to agree on action strategies for solving the problem*” (Steins and Edwards 1998 p. 4). The SDGs Partnerships

for sustainable development seek to share risks, pool resources and talents and deliver mutual benefits (Warner 2003). Action networks (another spin on partnership working) engage in collective action as part of collaborative management by formally adopting network-level courses of action and often delivering services (Agranoff and McGuire 2003), for example, Learning and Action Alliances (van Herk et al. 2011). Some challenges with such partnerships include a lack of resources, responsibilities, and political legitimacy/recognition as well as inadequate stakeholder representation, and/or missing linkages to established networks, as identified for Disaster Risk Reduction national platforms (Djalante 2012).

Having a diverse and inclusive group of actors ‘around the table’ facilitates experimentation and learning (Ansell and Gash 2007, Renn et al. 2011). However, the high transaction costs of multi-actor processes are well recognised in the literature (Vangen and Huxham 2003, Hegger et al. 2014). Furthermore, the output from collaborative arrangements can appear negligible or the rate of output to be extremely slow (so-called collaborative inertia) (Huxham 2003). However, costly decision-making processes can be made up for in those efficiencies or synergies gained in implementation processes e.g. joint data collection or modelling (Ridder et al. 2005). Huxham and Vangen (2000a) term this as ‘collaborative advantage’, which in the context of this research can be viewed as the synergies or efficiencies gained from integrating FRM across sectors. Furthermore, the membership structures can influence the actors’ ability to achieve collaborative advantage (Huxham and Vangen 2000a) or in this case, integration in FRM. Examples of this are the interaction between working groups and between representatives and their constituencies, especially in the case of heterogeneous constituencies (Mostert et al. 2008). Additionally, individual actors can also have an influence on knowledge exchange and collaboration amongst actors, so-called policy entrepreneurs (Mintrom and Thomas 2018), boundary spanners (Williams 2002) or champions (Taylor 2009). Such individuals will focus on building cultures of trust and aim to operate within non-hierarchical environments with dispersed configurations of power relationships (Mintrom and Thomas 2018). Williams (2002) argues that the availability of individuals with collaborative mind-sets and skills play a pivotal role in determining the success of other inter-organisational structures or mechanisms. In the UK there have been numerous examples of amalgamation of government departments, with integration as one of the main aims, where the staff involved have continued to operate within their pre-existing boundaries, with little interaction across these old boundaries

(Lyal and Tait 2004). Although a favourable institutional framework including strong coordination mechanisms is necessary for strong policy integration, it is an insufficient condition (Russel and Jordan 2009). Therefore, within this research, it is argued that institutional structures are important, but they do not solely determine the effectiveness of integration.

Rule-based mechanisms are identified as those that determine how actors must interact e.g. powers to request information or duties to cooperate (Gilissen et al. 2015), statutory consultation requirements (Gilissen et al. 2015, Candel and Biesbroek 2016), statutory tests/ impact assessments (Stead 2008, Gilissen et al. 2015), cooperation agreements or Memorandums of Understanding (Agranoff 2006), framework contracts (Bakker et al. 2006), and standards/ regulations setting (Candel and Biesbroek 2016). Consultation processes ensure some form of multi-actor engagement is completed for policymaking, although the design and resulting effectiveness of such processes can vary (Innes and Booher 1999, Newig and Fritsch 2009). Furthermore, implementing innovative solutions, such as Sustainable Drainage Systems (SuDS), was found to require changes to regulations to support uptake (Ashley et al. 2013). Bakker et al. (2006) propose a framework to identify if different procurement arrangements are appropriate for supporting collaboration.

Resource-based mechanisms are identified as the funding arrangements which help actors to implement joint-actions in the form of operational activities, projects or programmes of work, including their ability to hire and train staff. Examples are as follows: overarching funding programmes (Stead 2008), combined external funding sources, financial incentives e.g. tax deductions (Candel and Biesbroek 2016), financial contributions (e.g. from developers), or in-kind resources sharing (e.g. staff time). Complications were found to arise to align sector-specific funding and FRM funding. For example, Morris et al. (2016) identified the difficulties and high transaction costs for farmers and landowners to apply for funds within FRM specific funds, given their smaller scale, thus relying on FRM projects operating at the landscape scale to make applications on behalf of land managers. Therefore, although in principle ‘mixing and matching’ multiple sources of funding, including FRM sources, are potentially attractive, some are not compatible and do not fully incentivise contributions from other sectors (Morris et al. 2016). Furthermore, limited examples of joint funding mechanisms were identified across the literature.

Combinations of different mechanisms are needed to influence integration (Gunningham and Sinclair 1999). Furthermore, as emphasized in the PAA, the application of such mechanisms can happen in a phased, parallel fashion and can be implemented at different speeds. Schout and Jordan (2005) found that although governments implemented more mechanisms that were supposed to deliver more integration, the mechanisms themselves were poorly coordinated with one another. Furthermore, individual agency can interact with the different actor-, rule- and resource-based mechanisms, but also can be influenced by them, so-called ‘structure-agency interplay’ (Giddens 1984, Hay 1995). This interplay is also recognised in the PAA whereby the policy arrangements are subject to continual change (Arts et al. 2006). Overall, it is clear that many factors can influence the availability and quality of actor-, rule- and resource-based mechanisms to achieve integration in FRM.

2.3 Realising integration in flood risk management practice

This section of the literature review argues for the need to identify how much integration is realised in practice through knowledge, policies and interventions, given the existing governance capacity for integration. Unlike the previous section outlining a means to assess the governance capacity for integration, there are no dominant theories or literature that demonstrate this. Instead, there is a widespread mix of literature covering the realisation of knowledge jointly through (social) learning (Walker et al. 2004, Armitage et al. 2008), achieving coherence across policies on cross-cutting issues such as FRM (OECD 2015a) and capturing synergies across FRM and sector-specific interventions (APFM 2017). This demonstrates the need for a practical approach to collecting literature on FRM and how this can be used to assess the degree to which FRM is realised in practice.

2.3.1 Knowledge

The need for knowledge of flood risk to be available, assessable and used to improve policies and interventions is well documented. Thus, knowledge acts as a connector/bridge between the governance capacity for integration and realising it in practice. In particular, there is a strong link between actor-based mechanisms, especially partnerships/forums, whereby knowledge is shared/exchanged to develop a joint understanding of a problem. In some cases, these processes of knowledge development, act as the key producer of knowledge, for example through collaborative planning (Bae et al. 2016, Challies et al. 2016, Evers et al. 2016) or modelling (Basco-Carrera et al. 2017). However, in other cases

these act as the forum to align mind-sets and allow actors to decide jointly to conduct particular studies or assessments to fill any knowledge gaps to address the FRM problem/challenge as a whole e.g. whole-system understanding (integrated modelling of all sources of flooding and its integration with people and ecology). The development of such knowledge could then act as the input to support policy and plan development and/or directly support the implementation of interventions. Collaboration to generate knowledge and continuously learn goes far beyond ‘formal consultation processes’ of engaging partners (Innes and Booher 2005).

Overall such knowledge results in a common understanding for further cooperation (Mostert et al. 2008). The selection and implementation of policies and interventions should be based on sound evidence, ideally gathered using multi-actor processes (Underdal 1980, Newig and Fritsch 2009, Evers et al. 2012, Challies et al. 2016). For example, modelled input from risk assessments is required to evaluate interventions and support rational comparison between measures, for example through Multi-Criteria Analysis and/or Cost-Benefit Analysis (Penning-Rowsell et al. 2005, Hajkowicz and Collins 2007, de Bruin et al. 2009, Van Ierland et al. 2013). However, the knowledge itself can be considered a ‘small win’ for integration itself, and thus is considered a fundamental/critical element of the realisation of integration in practice. Small wins, captured through learning by doing, can result in gradual outcomes that improve mind-sets about what is possible and worth doing (Feldman 2000, Newig et al. 2010). As this knowledge accumulates, it can further influence integration through policies and interventions. Moreover, lessons from on-the-ground learning need to better inform decision-making by translating (tacit) knowledge into policy and practice (Barquet et al. 2016).

This process of learning through implementation is captured through theories/practices of adaptive management (Pahl-Wostl et al. 2007, Gersonius et al. 2016), adaptive co-management (Olsson et al. 2004, Armitage 2008), network governance (Newig et al. 2010) and adaptive governance (Folke et al. 2005) which focus on ‘learning under uncertainty/changing conditions’. Additionally, Soft-Systems Methodology (SSM) (Wilson 2001, Checkland and Poulter 2010) also incorporates elements of learning and collaborative action. Social learning can be summarised as learning together to manage together (Ridder et al. 2005) and cuts across these management practices. Individual and collective learning (single, double and triple-loop learning) (Walker et al. 2004, Armitage et al. 2008) and self-organized learning processes (Folke et al. 2005) are core to developing knowledge among

actors and also aligning mind-sets and reconciling conflicts. Furthermore, given the multi-disciplinary nature of FRM, additional ‘knowledge brokers’ are needed to help actors communicate across different professional languages. Interaction between professionals in emergency response (Alexander et al. 2014) and between scientists and practitioners (Faulkner et al. 2007) are examples of where such knowledge brokering is needed. The value of social learning is well documented amongst multiple actors for integrated water resources management (Mostert et al. 2008), flood risk partnerships/management (Benson et al. 2016), and Blue-Green infrastructure Learning and Action Alliances (van Herk et al. 2011), for example in Newcastle (O’Donnell et al. 2018).

This element is identified as being continuously adapting to new knowledge availability in a non-strict fashion, whereby knowledge is gained through the implementation of interventions and/or through additional studies or simply through knowledge sharing amongst actors in a non-linear way and is always growing. Therefore, allowing an iterative learning process to evolve (Foster-Fishman and Watson 2012) starting with less complex issues, such as data exchange and joint research (Dieperink et al. 2016). Thus, generating knowledge, such a ‘small win’ should activate learning that results in changes to actor relationships, inform policies or provide evidence for better implementation of interventions. Furthermore, jointly producing knowledge (e.g. models, scenarios and assessment reports) across multiple actors can increase credibility by bringing multiple types of expertise to the table, and it can enhance legitimacy by providing multiple stakeholders with more transparent access to the information production process (Cash et al. 2003). Therefore, given the above discussion, the presence of knowledge jointly developed by and accessible to multiple actors, and the use of the knowledge to influence other aspects of integration, such as relationships, policies and interventions in FRM is important.

2.3.2 Policies

An integrated policy has been defined as “*one where all significant consequences of policy decisions are recognized as decision premises, where policy options are evaluated on the basis of their effects on some aggregate measure of utility, and where the different policy elements are consistent with each other*” (Underdal 1980 p. 162). Policies, in the context of this research, are viewed as ranging from plans at different boundaries (e.g. geographical, administrative, catchment) to programmes of planned work. Within the literature advocating for policy integration, the terms ‘alignment’ and ‘coherence’ are regularly present (OECD

2015a). Policy coherence as used by the OECD is identified as the systematic promotion of mutually reinforcing policy actions across government departments and agencies by fostering synergies and identifying trade-offs across domains to achieve agreed objectives (OECD 2015a). Furthermore, policies must be coherent to not undermine specific objectives (Candel and Biesbroek 2016, Benson and Lorenzoni 2017).

European policies have facilitated formalised approaches to policy integration for integrated water resources management through the Water Framework Directive (WFD; 2000/60/EC) and integrated FRM through the Floods Directive (2007/60/EC). Similarly, global policies such as the Sustainable Development Goals emphasise policy coherence (OECD 2015a) and the Sendai Framework for Disaster Risk Reduction advocate for developing DRR plans that are coherent with other plans (UNISDR 2015b). Additionally, joint plans have emerged to specifically address the need for integration across specific policies, for example with marine policy and transport and health (Underdal 1980, Stead 2008, Candel and Biesbroek 2016). Within the FRM domain, such catchment-based plans that combine FRM and environmental objectives are broadly recommended and will often cut through national borders. Other plans such as Green Blue Infrastructure or Water Sensitive City plans have emerged that tackle water management alongside FRM and infrastructure objectives. An example of this is the New York Green Infrastructure Plan (NYC Department of Environmental Protection 2010). Although, in principle, the river-basin approach should enable coordinated FRM, in practice, this is not always the case because decisions are made based on administrative borders, thus management remains within national borders (Hartmann and Spit 2016, Benson and Lorenzoni 2017).

Across the literature, the importance of aligning objectives and interventions across plans is identified. Drawing on the work of Nilsson et al. (2012), coherence can be understood to be high where policy objectives and associated targets are fully aligned across institutions (i.e. these objectives should not be contradictory or mutually exclusive), whereas incoherence would be associated with non-alignment. Furthermore, the interventions (or outputs) should be consistent (Benson and Lorenzoni 2017). A lack of coordination makes it difficult to assess which combination of flood strategies (Hegger et al. 2014, Suykens et al. 2016) is best suited for FRM within the whole river basin district. Alternative interventions need to be evaluated from an ‘overall’ (or holistic) perspective rather than from the perspective of each actor or sector, whereby interests and priorities are weighed up across sectors (Underdal 1980).

The European Union stresses the need for alignment between FRM and RBM plans, as outlined in their guidance document (technical report) explaining the links between the two and emphasising the need to capture win-win solutions (European Union 2014). It indicates that *“Coordination provides an opportunity to maximise synergies by identifying cost-effective measures which serve multiple purposes and can result in “win-win” measures being implemented”* (European Union 2014 p. 8). The implementation of the Floods Directive was identified as facilitating some degree of integration between the River Basin Management Plan and the FRM plan. The plans offered an opportunity to adopt a new approach to optimise the mutual synergies and minimise conflicts between them. For example, the Rhine Flood Risk Management plan (ICPR 2015) includes aligned objectives and interventions across countries, and a strong commitment to working with nature and integrating with environmental and agriculture-based objectives. Another positive example is the Danube FRM plan which similarly emphasises natural water retention interventions with multiple benefits for water quality and habitat improvement (e.g. sustainable forestry and agricultural practices, sustainable drainage systems, and wetland restoration) (ICPDR 2015). The same geographical boundary (or unit) is used for both plans making it easier to align interventions. However, it was identified that wishful concepts and ideas put forward in the plans require more stringent collaboration with other sectors, which is outside the control of those implementing the FRM plans. For example, this might involve aligning the mechanisms with the agricultural sector through the changes to the Common Agricultural Policy (CAP) (Morris et al. 2016) or with spatial planning (Hartmann and Driessen 2017) because it can result in sub-optimal solutions for FRM. Thus, there is still a barrier to connect more strongly with additional sector-specific plans. However, further research is required to explore how much coherence, or integration, is evident across environmental policies (Benson and Jordan 2012).

Another factor identified across the literature that influences coherence or integration between plans is the consistency of the timing of preparation, monitoring and renewal (Stead 2008, OECD 2015a). Additionally, the maturity of the plan and the associated legislation can also have an influence, for example, the harmonisation between the EU FRM plans and RBM plans as the timescales of planning and review are synchronized (Hartmann and Driessen 2017). There is a two-way feedback process needed, that requires some staggering for effectiveness. For example, a flood risk management plan can feed and support local development plans/ spatial strategies (Hartmann and Driessen 2017). However, planning

authorities typically have more control over land use planning and development and thus can be difficult to influence and engage with, slowing down the potential for integration at the local level (White and Richards 2007, Ran and Nedovic-Budic 2016). Whereas for other sectors e.g. water management or agriculture, prior alignment and agreement are needed to design joint measures that enable multiple objectives, thus FRM needs to engage with their planning process as well as facilitating their engagement in the FRM planning process. However, this is more challenging for infrastructure development projects. Creating pipelines of infrastructure (another form of a plan) translate countries' overall policy objectives into coherent sets of infrastructure projects (OECD 2018a). OECD analysis found that more progress is required to mainstream adaptation (and thus flood risk management) into infrastructure plans (Vallejo and Mullan 2017), whereby some plans identify additional projects relevant for climate resilience, while others focus more on the enabling conditions for infrastructure. By doing so, it ensures the cumulative total of projects being planned is consistent with overall objectives and helps to improve sequencing of inter-related projects and delineate responsibilities for implementation. More generally, there is a need to ensure that infrastructure pipelines are publicly available and clear in specifying the targets for infrastructure provision and associated budget (Vallejo and Mullan 2017).

Overall, the need for alignment between FRM and RBM plans to ensure environment and agriculture-related objectives are connected with FRM is well recognised across plans-FRMP, RBMPs and in connection with Green-Blue Infrastructure. However, the coherence between FRM and infrastructure is less dominant – this is likely because the remit of integrating with such plans is outside the remit of the EU directives. Therefore, given the above discussion on policy integration, the following indicators were identified to assess the strength of plans to enable integration; availability of new/ joint plans, the alignment of objectives and interventions across plan boundaries, and the consistency of timeframes for preparation, monitoring and renewal. One of the criticisms of 'coherence' is that it stops at the plan-making stage and does not consider the success or failure of the policies in practice (see Nilsson et al. (2012)). Therefore, this connects us to the next part of the literature review on interventions, focusing on their implementation in practice.

2.3.3 Interventions

To realise integration in practice it is fundamental that FRM and sector-specific interventions capture synergies and efficiencies. Management approaches to integration in the context of FRM argue the importance of taking a systems approach, looking at the catchment as a whole to understand the positive and negative influences of interventions accounting for the spatial and temporal complexity across boundaries (Hall et al. 2006, WMO 2009, van Herk et al. 2015, APFM 2017). Furthermore, such FRM approaches advocate the implementation of different FRM interventions ranging from small-scale actions to large-scale investment projects or maintenance programmes. There are various categorisations of such measures (within or across strategies); structural vs. non-structural (Parker et al. 2007a, Hutter et al. 2008), hard vs. soft measures (Hall and Solomatine 2008), measures vs. instruments (Olfert and Schanze 2005), or technical measures vs. policy instruments (Klijn et al. 2015). The Floodsite project defined an intervention as “*a planned activity designed to effect an improvement in an existing natural or engineered system (including social, organisation/defence systems)*” (Samuels and Gouldby 2009 p. 28). This broader term ‘intervention’ is used here as it offers a more systemic perspective and makes it easier to distinguish between interventions that directly and indirectly influence flood risk.

Table 2-2 outlines various examples of the different types of interventions, grouped into different FRM strategies to prevent new risk, reduce existing risk and manage residual risk (UNISDR 2015a, Raadgever et al. 2016). Interventions that actively account for the interactions with other FRM and sector-specific objectives and interventions are more integrated. To select and implement a diverse mix of interventions across strategies (Hayes 2004, Hall et al. 2006, Jha et al. 2012), cross-sectoral working is required and thus integration is needed to capture synergies and manage trade-offs between FRM and sector-specific interventions (GWP 2000, Johannessen and Granit 2015, APFM 2017). For example, for preventing risk, housing and building code regulations and land use planning are typically outside the remit of flood risk managers, therefore require integration with planning authorities and housing regulators (Ran and Nedovic-Budic 2016). Similarly, to reduce existing risk some intervention options include upstream catchment management and reservoir which requires integration with agricultural and environmental sectors, thus collaboration with farmers and landowners (Morris et al. 2016). Whereas, for achieving a successful Early Warning System (EWS), strong integration is needed with the emergency management measures, such as temporary defences (Parker et al. 2007b).

Table 2-2 FRM strategies and interventions

FRM strategy	Interventions
Preventing new risk	<ul style="list-style-type: none"> • Risk sensitive land use and infrastructure planning • Flood zoning • Housing and building code regulation • Managed retreat/ realignment • Relocation of houses/ resettlement • Relocation of critical services (e.g. water treatment plant)
Reducing existing risk	<ul style="list-style-type: none"> • Embankments • Coastal barriers • River channel improvements (dredging, by-pass channel) • River restoration / wetlands/ natural buffers • Dam and reservoir management • Water retention/ detention areas • Raising the level of houses/ infrastructure • Property level resistance/ resilience measures • Urban drainage/ Sustainable Drainage Systems (SuDS) • Upstream catchment management • Controlled flooding
Managing residual risk	<ul style="list-style-type: none"> • Forecasting and early warning system • Awareness and education programmes • Emergency communication system • Emergency plans • Emergency measures (pumps, temporary barriers) • Evacuation simulations and drills • Trained volunteer network • Flood compensation system/ social safety system • (Re)insurance to fund recovery and reconstruction • Building back better • Financial protection (contingency funds)

Synergies can be identified both from an FRM and sector-specific perspective (WMO 2009; Challies et al. 2016). Overall investments in FRM interventions can make integral and wider contributions to sustainable development. From an economic development perspective, investing in large-scale flood-protection infrastructure projects can reduce the risk in highly productive areas and enable economic growth and capital investment (Tanner and Rentschler 2015, Tanner et al. 2016). This can lead to wider benefits for employment opportunities, innovation and entrepreneurship. From an environmental perspective, natural retention related interventions (e.g. improving river basin land use, preventing rapid runoff by tree planting and restoring rivers natural floodplains), will positively reactivate the ability for natural wetlands/ floodplains to alleviate flood risk and support biodiversity, recharging of aquifers, cleaner drinking water, recreation and tourism areas. For example, the Penrith

Lakes Scheme development scheme in New South Wales Australia, flood protection enabled a recreation and tourism area and brought low impact environmental jobs to the area (NSW Department of Planning 2016). Another example is the Fort Collins, Colorado redevelopment project in a derelict former golf course which was bought by a local employer and redeveloped in a way that brought amenity, wetland restoration and employment benefits to the area (U.S. Climate ResilienceToolkit 2018). Therefore, capturing these benefits of integration to meet both FRM and sector-specific objectives is important.

Merging objectives across sectors, such as water supply, transport and flood protection infrastructure can deliver benefits on both sides (Tanner and Rentschler 2015). Multi-purpose interventions can capture synergies, such as urban detention basins built in combination with road infrastructure and/or recreation areas, for example, the Water Square Rotterdam (de Graaf and der Brugge 2010). At a city scale, urban planning is commonly integrating FRM, through concepts of green infrastructure, green-blue infrastructure, SuDS (Lawson et al. 2014) and water sensitive cities (Wong and Brown 2009, Ashley et al. 2013) as a complement to, and sometimes replacement of grey infrastructure (e.g. water pipes, pumps, and sewers) because of the multiple benefits it provides (Meerow and Newell 2017). Blue-green infrastructure interventions also offer environmental benefits by in the urban heat island effect, improved air quality, increased biodiversity, habitat enhancement and related ecosystem services (Lawson et al. 2014). Other projects focus on defending rivers and coasts or catchment management yet integrate with other objectives like nature and recreation to make space for water rather than boxing it up e.g. Room for the River project in The Netherlands and Making Space for Water in the United Kingdom.

In addition to capturing the synergies, there are regularly trade-offs, negative side-effects, or conflicts that can develop between different FRM and sector-specific interventions (WMO 2009, Sayers et al. 2014, APFM 2017). If one intervention is implemented it may mean that something else cannot be achieved (i.e. trade-off) or that there is an unintended consequence (i.e. negative environmental, social or economic side effects). In this sense, integration can be achieved by one sector or across one boundary but at the expense of another. Therefore, action needs to be taken to minimise these trade-offs. Developing a good understanding and knowledge of the interdependencies is important to identify trade-offs and negotiate how they could be managed (Hermans and Thissen 2008). FRM interventions can have negative side-effects on agriculture (e.g. reduced productivity of land), rural

settlements and water pollution from contamination due to interference with the natural river flow (Morris et al. 2016). From a risk-informed development perspective, projects need to balance the need for new housing and facilities versus the risk of building in flood-prone areas (Hartmann 2016). For example, implementing zoning restrictions in 1 in 100-year floodplains may constrain development in popular locations, thus having a negative consequence for economic growth. The higher building costs for more resilient infrastructure can be seen as a short term trade-off but a long-term benefit for economic growth (Mcdermott 2016). Compensatory or counterbalancing interventions may be required to manage any increases in risk or reduce the consequences. Furthermore, selecting one measure can make it more difficult to select another in the future, for example, once a new housing development is established in a vulnerable location, it is difficult for that pattern of spatial planning to be reversed (Mcdermott 2016).

Aside from the synergies and trade-offs, the ability for integration to maximise efficiencies for both FRM and sector objectives was identified in the literature (Sayers et al. 2014, Alexander et al. 2016). An example of this is the time saved during the implementation phase due to effective multi-actor decision-making process (Ridder et al. 2005). Furthermore, cost-saving can emerge from simplified contracting arrangements or use of materials on-site when implementing a scheme (Bakker et al. 2006). Utilising green-blue infrastructure has been shown to reduce costs when compared to grey infrastructure. An example of this is the Green Streets project in Portland USA, which used improved landscaping and increased infiltration to reduce storm water runoff at a cost of \$8 million compared to an expected cost of \$250 million for using hard infrastructure (Foster et al. 2011). Inefficiencies can also develop as a result of integration, for example, if one FRM or sector-specific intervention is implemented now, then another project may be delayed as a result. This was identified as a problem, in particular for aligning the implementation timelines of different infrastructure and growth projects (Vallejo and Mullan 2017). One area of development that looks at the implementation of interventions over time is ‘adaptive pathways’ which identify a wider range of options for addressing uncertainty to create sequenced packages of investment that consider interconnections, for example in Thames 2100 Estuary Plan (Ranger et al. 2013).

Therefore, given the above discussion, the importance of assessing the degree to which synergies are maximised, trade-offs managed, and efficiencies gained in interventions is important for realising integration in practice. By capturing these ‘small wins’ across

different FRM and sector-specific projects more tangible outcomes for integration in FRM can be more clearly demonstrated. However, this is of course highly dependent on the governance capacity for integration, as explained in Section 2.2.

2.4 Elements of integration in flood risk management and their interaction

The above discussion demonstrated that integration in the context of FRM can be assessed by understanding the key elements of the governance capacity for integration - actor relationships and influencing mechanisms, and for realising integration in FRM practice – knowledge, policies and interventions. These elements are conceptualised in Figure 2-5 given a specific integration challenge (discussed further in Section 2.5.1). This section demonstrates how these different elements interact, whereas Section 2.5 focuses specifically on how to assess the degree of integration in FRM.

The conceptualisation presented in Figure 2-5 aims to demonstrate the non-linear, cyclical and continuous nature of achieving integration in FRM – as similarly identified across organisational change (Vermaak 2013, Termeer et al. 2017), institutional/policy change (Arts et al. 2006), collaborative governance (Ansell and Gash 2007, Emerson et al. 2012) and flood risk governance (Hegger et al. 2014, van Herk et al. 2015) literature. In this research, it is assumed that the elements of integration are in constant motion, interacting with one another both in clockwise and anti-clockwise directions and in many cases dependant on one another to realise integration in FRM practice, as demonstrated in Figure 2-5 and identified by other scholars (Keast et al. 2007, Candel and Biesbroek 2016). Furthermore, it is assumed that these elements of integration do not move in parallel or at the same speed and represent an ongoing process where an assessment can start at any element, as similarly recognised in the PAA (Arts et al. 2006).

This research supports the dimensions of policy integration proposed by Candel and Biesbroek (2016) who describe how each dimension of integration (policy frame, policy goals, subsystem involvement and policy instruments) can have less or more degrees of integration whereby different dimensions develop at different rates over time. When conceptualising the progression of integration over time, research on transformational change (Termeer et al. 2017) helps to draw insight into the dynamic nature of progressing towards a higher degree of integration. Furthermore, the PAA can be used to analyse the

institutional patterns of change and stability (Arts et al. 2006). In such a way, supporting the argument that changes or improvements to one element of integration for a specific integration challenge will result in a ripple effect influencing other elements.

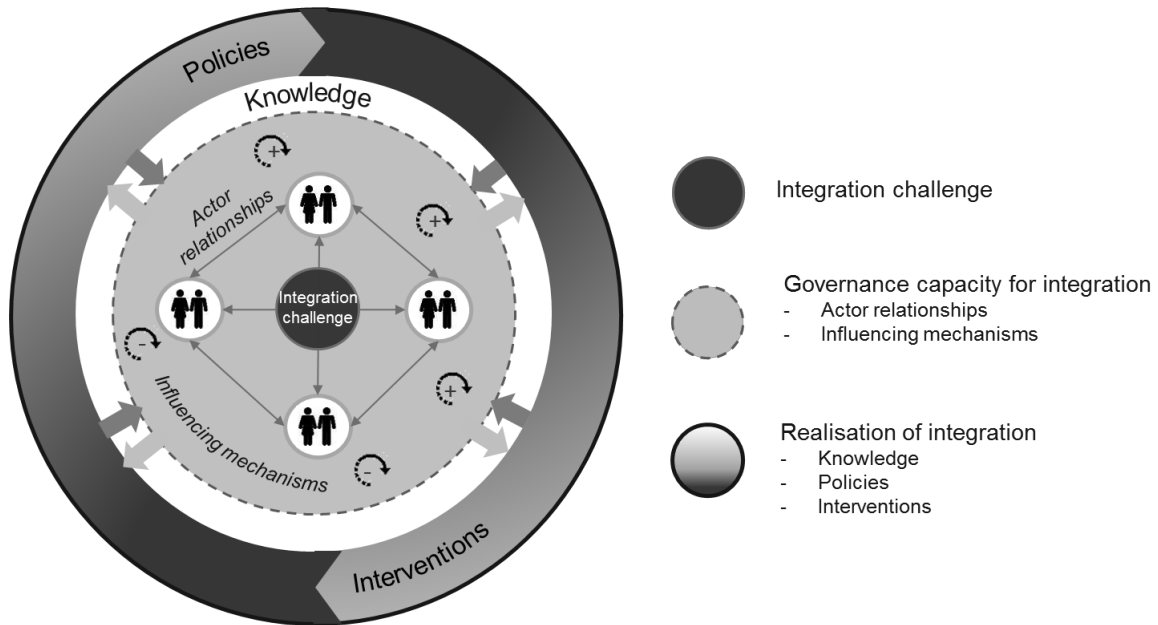


Figure 2-5 Conceptualisation of the key elements (and dimensions) of integration

Termeer et al. (2017) summarises the depth, speed and scope of change in relation to achieving transformational and incremental change, see Figure 2-6. Termeer et al. (2017) argue that in practice, such transformational change requires smaller incremental changes to occur first, often in the form of ‘small wins’. By enabling a continuous emergent process of integration gradual continuous ‘small wins’ can accumulate to achieve deep (or transformational) change (Termeer et al. 2017). The perspective that accumulated ‘small wins’ can enable change (in a non-linear way) is rooted in theories of sense-making (Weick 1995) and continuous change (Weick and Quinn 1999). This can be translated into the context of the key elements of integration in FRM, highlighting the need for gradual changes to each of the key elements, reinforcing one another to increase the degree of integration. One such example is the development of knowledge which in turn builds actor relationships and helps them to identify plans for joint action through social learning (Mostert et al. 2008). The mix of mechanisms can delay or speed up integration efforts as they interlink with one another. However, some scholars argue that incremental changes to adapt can result in such ‘small wins’ but this can lead to avoiding larger changes and thus delay transformation, e.g. Pelling et al. (2015) concerning climate change.

	Incremental change	Transformational change
Depth of change	First-order change Improve existing practices in the same direction	Second-/third-order change Alter paradigms, values, and worldviews
Scope of change	Small scale, micro, parts of the system	Large scale, macro, system-wide
Speed of change	Slow, step by step, short term	Quick, big jumps, long term

Figure 2-6 Dimensions of change (Termeer et al. 2017)

Furthermore, the literature on institutional/policy change (Arts et al. 2006) and institutional interplay (Young 2006) demonstrate the interplay between different mechanisms and individuals which can progress or hinder integration at different rates. Additionally, integration is likely to happen between different sectors, sources of flood risk and spatial boundaries at different rates depending on the drivers and enablers. This is similar to the dynamics of cross-level cross-scale interplay theorised by Cash et al. (2006). These interactions are strongly considered in this research, as integration is conceptualised as being in constant flux with interactions between elements (both in clockwise and anti-clockwise directions), as demonstrated in Figure 2-5.

Overall, this section demonstrates the dynamic and intertwined nature of the key elements of integration, which needs to be understood when assessing how to improve the degree of integration in FRM over time. This leads on to a deeper discussion on assessing integration in the next section.

2.5 Assessing integration in flood risk management

The discussion so far in this chapter highlighted the key elements of integration and the theory and literature surrounding their selection, possible means to assess them individually, and their dynamic interactive nature. Building on this, the following section discusses how an assessment of integration can be approached. It first explains how the different integration challenges in FRM can be identified for assessment. Next, the different ways to measure the degree of progress on achieving integration in FRM are explored drawing on governance and FRM literature. Finally, the external factors that are likely to positively or negatively influence the degree of integration in FRM are discussed.

2.5.1 Identifying the integration challenge

Different types of integration challenges in the context of FRM exist across different sources of flood risk, FRM strategies, spatial and temporal scales and sectors/policy domains. If an assessment of integration is completed, then the aspect of integration being measured or assessed should be identified. The more specific one can be about what is being assessed, the more accurate and focused the assessment of integration can be. Different integration challenges will have their own unique set of actors, and influencing mechanisms (actor-, rule- and resource-based), therefore, different governance capacities and abilities to realise integration in FRM practice. The literature identified that captures these different integration challenges is further discussed herein.

Horizontal and vertical integration are commonly used terms to distinguish different types of integration. Horizontal integration is seen as integrating across different policy domains or sectors, in comparison to vertical integration focusing on integrating across different levels of the same scale e.g. national to local (Russel et al. 2018). Although some scholars and policymakers refer to this as the vertical and horizontal consistency (Persson 2004), coherence (OECD 2016) or governance (Lyll and Tait 2004). This distinction between horizontal and vertical integration is very useful to identify the potential areas for integration, however, it fails to recognise the additional characteristics of integration needed for FRM.

To achieve horizontal integration the common objectives or goals across multiple actors need to be identified. The organisation of sectors and policy domains is generally fragmented (Gilissen et al. 2015) or siloed. The case of FRM is no different where actors are commonly spread across multiple sectors for the management of different types of flood risk. FRM requires sector-specific actors to take risk management measures to e.g. agriculture (water storage or retention) or infrastructure (managed drainage). Even within organisations, responsibilities can cut across sector or policy domain boundaries. It is crucial to identify the common (and conflicting) objectives so that they can be jointly managed across actors.

Given the multiple sources of flood risk, and similarly for other hazards, the physical boundaries, such as those between the surface and groundwater, fresh and coastal waters, and water and land, and pumped and natural systems need to be considered (Mostert et al. 2008). Adopting a basin-wide or catchment approach is widely advocated for within the use

of integration for FRM (WMO 2009, Sayers et al. 2013). Furthermore, considering the changing frontier between land and water boundaries, for example through housing development on flood plains, this warrants more consideration of the physical interactions across boundaries (Tempels and Hartmann 2014).

FRM has been increasingly advised to employ a combination of FRM interventions that aim to prevent new risk (spatial planning), reduce existing risk (flood defence and mitigation) or manage residual risk (preparedness, response and recovery) (UNISDR 2015b, Hegger et al. 2016, Raadgever et al. 2016), see Figure 2-7. This is rooted in the recognition that a diverse combination of interventions is needed rather than focusing on one FRM strategy, such as defence, which can cause technical lock-in to structural solutions (Hayes 2004, Hall et al. 2006, Aerts et al. 2008, Jha et al. 2012, van Herk et al. 2015). Therefore, if a more diverse mix of FRM strategies is used for FRM, this strengthens the need for more integration accounting for the synergies and trade-offs across these strategies.

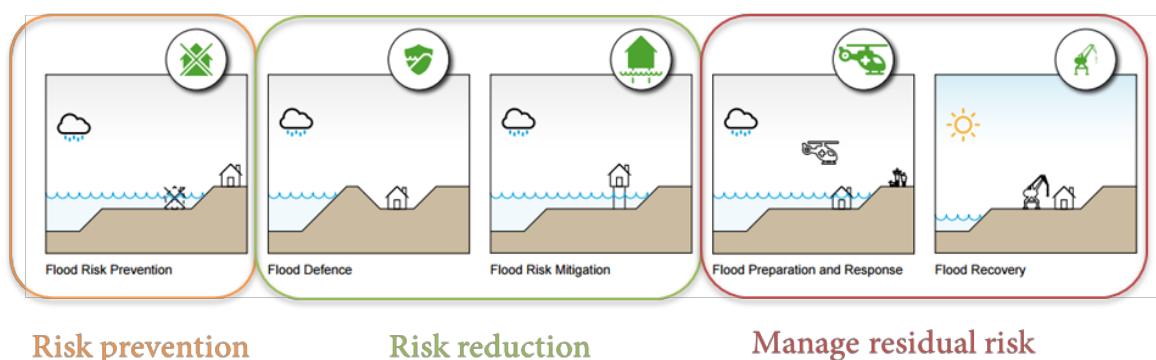


Figure 2-7 Five FRM strategies as defined in the STARFLOOD project and grouped into three components highlighted in the Sendai Framework (UNISDR 2015b, Hegger et al. 2016).

Integration is needed across multiple spatial boundaries; however, this is not limited to those recognised in vertical integration (as the spatial levels across organisational boundaries – national, regional, local). Other boundaries include administrative boundaries between different countries, government levels and policy sectors, where there is commonly a desire to frame issues at a single level to simplify and control (Cash et al. 2006). Gibson et al. (2000 p. 218) define scale as “*spatial, temporal, quantitative or analytical dimensions used to measure or study any phenomenon*” and a level as “*units of analysis that are located at different positions on a scale*”. Spatial and temporal scales are the most commonly considered, however, jurisdictional, institutional, networks, management and knowledge scales are gaining further recognition (Cash et al. 2006). Furthermore, different actors prefer

different levels and scales based on their interests and objectives (Dore and Lebel 2010). Recognising that these boundaries will always exist albeit in different forms, sparks the need for integration efforts and approaches to work jointly across them (Mostert et al. 2008). Scales of governance issues need to be adapted to the environmental issue at hand (Young 2006) where cross-scale interactions are necessary.

In addition, integration is often required across different timescales of activities within or between organisations. For FRM, many organisations will have multiple roles across strategic, operational (and/or implementation), and incident management timescales. There are opportunities for integration across these different timescales because what happens in one will influence the other (Cash et al. 2006, van Herk et al. 2015). Other scholars have referred to this as strategic and operational integration but do not emphasise the connections between the two (Ran and Nedovic-Budic 2016). Overall, it is argued here that the potential for integration is more complex than portrayed using horizontal and vertical integration, especially for FRM with such a range of possible interventions and both physical and spatial boundaries that require consideration. Different flood risk governance contexts will require more or less integration across different sectors, spatial boundaries and types of FRM strategies or sources of flood risk. The different integration challenges for FRM are illustrated in Figure 2-8, highlighting the importance of looking across multiple challenges.

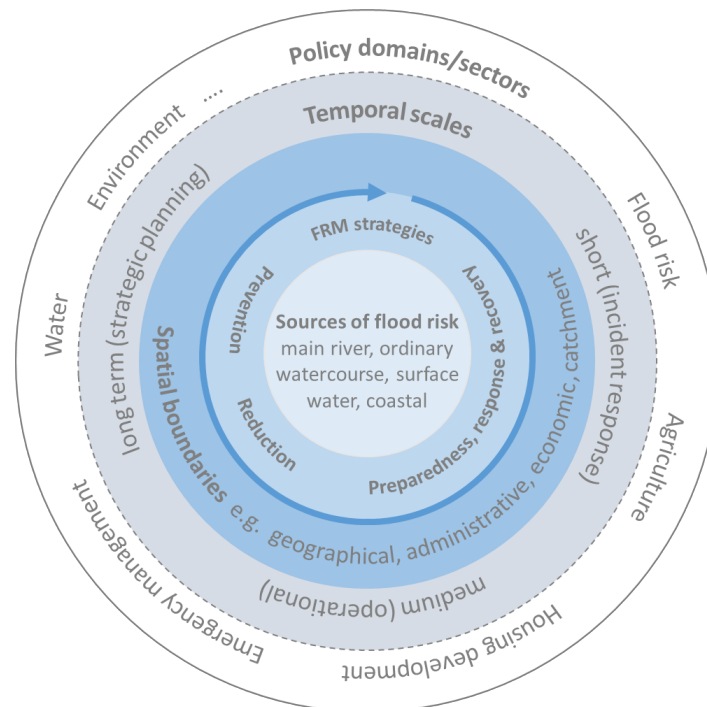


Figure 2-8 Overview of possible integration challenges for FRM

Given the varied interpretations and application of integration, asking the question ‘integration of what into what?’ can help. This creates quite a complex picture of integration in FRM; however, it is relevant and important to clearly distinguish what aspect of integration is specifically being assessed in FRM. Similarly, the need for clarity in other terms is recognised in the literature, for example, “Resilience of what to what?” - that is, over what time and at what scale (Carpenter et al. 2001). As emphasised by Termeer et al. (2010) cross-scale complexity means that multiple levels of one scale need to be matched with multiple scales of another to find good solutions. In such a way, an integration challenge in FRM can also be a combination of different specific challenges e.g. cross-sectoral and spatial scale. Overall, clarity is needed about what integration means in the context of an assessment for FRM, Figure 2-8 aims to help to determine this.

2.5.2 Classifying degrees of integration in flood risk management

This section explores the possible means to develop a scale of integration to represent different degrees of progress on integration in FRM. As such, specific integration challenges can be identified as having a higher or lower degree of integration. Therefore, the degrees of integration can be assessed by combining the assessment of the elements of integration to generate one combined degree of integration. Having such a scale can act as a useful way to set direction on how and what to improve to reach a higher degree of integration or maintain an existing degree of integration. Representing the degree of integration can be useful to compare progress on achieving integration over time, for different integration challenges or in different governance contexts. Furthermore, in combination with an assessment of each of the elements of integration, it can help to identify which ones are hindering the progress of integration.

Further insights into assessment scales can be found by looking across other bodies of research, such as resilience, vulnerability and governance. Index-based approaches have emerged from resilience and vulnerability related studies. For example, the resilience index which quantifies an index and weighting based on variables calculated from data sources e.g. percentage of the non-elderly population (Cutter et al. 2010). Qualitative scales identified included those using the terms high, medium and low for assessing risk and vulnerability indicators that are difficult to quantify, for example within the Community Based Risk Index (King and MacGregor 2000, Birkmann 2007). Additional studies were

found to use a numerical scale of 1 to 10 associated with qualitative indicators e.g. recovery capacity of FRM (de Bruijn 2004).

Within governance-related research, additional approaches were identified. For example using a Likert scale (from – to ++) to assess conditions for success in the water governance capacity framework (EIP Water 2016, Koop et al. 2017), as presented in the radial diagram in Figure 2-9. Other qualitative approaches include using indicators and textual description without a measurement scale, for example, the evaluation of flood risk governance using evaluation criteria and benchmarks (Alexander et al. 2015). Additional governance index-based approaches were identified. Examples are as follows: the worldwide governance indicators (Kaufmann et al. 2010), water governance principles (OECD 2015b) and the Index of Governance and Public Policy in Disaster Risk Management (Lacambra et al. 2015).

Existing scales of policy integration were identified from the literature. For example, very high to very low used to assess specific dimensions of integration (Candel and Biesbroek 2016) and fully integrated to fragmented used for assessing horizontal integration (Keast et al. 2007). Others have emerged for assessing similar concepts, for example, the degrees of (organised) coordination capacity by Metcalfe (1994) provides a 1 to 9 qualitative scale of how coordination may increase (or decrease). Therefore, these offer a good starting point to develop an assessment approach that identifies different degrees of integration in FRM.

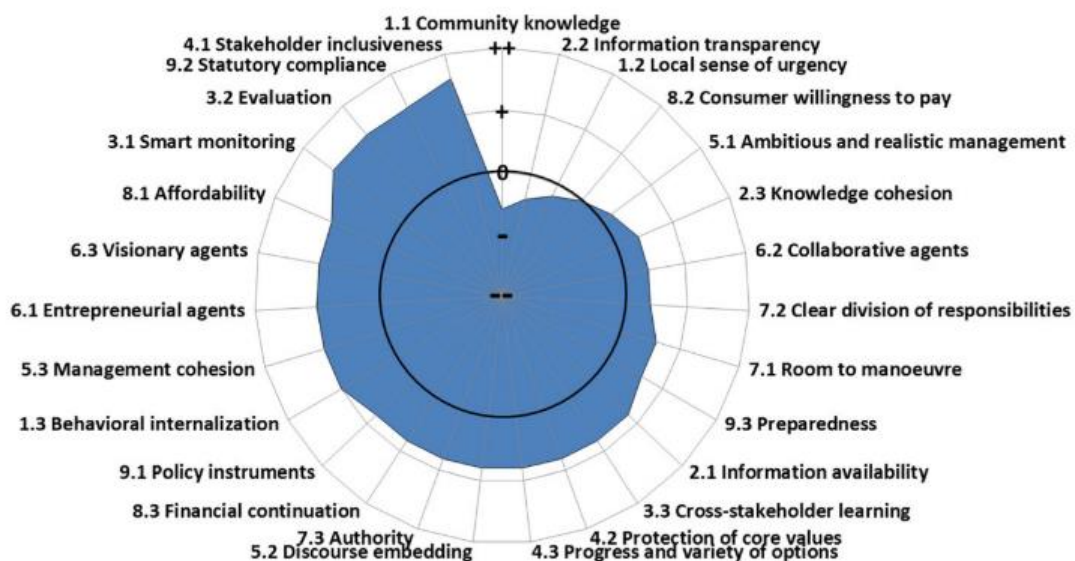


Figure 2-9 Radial diagram for the water governance capacity in Amsterdam (Koop et al. 2017)

Another aspect of using such assessment approaches is the weighting of indicators or criteria i.e. the relative importance of one over the other. When using more qualitative based scales this raises the challenge of how actors can be involved in setting such weights. For example, such an approach was used in participatory Multi-Criteria Analysis (Komendantova et al. 2014, Barquet and Cumiskey 2018) where actors could assign weights to different criteria within the assessment. This approach demonstrates the usefulness and flexibility of qualitative scales to capture stakeholders' views and preferences within an assessment.

Reflecting on the examples presented, generating a scale to conduct an assessment with qualitative data comes with its challenges. Given the time intensive and context specific nature of qualitative data, it is difficult to validate and ensure a representative sample when developing such a scale (Ungar 2003). A key challenge for a qualitative scale is to simplify complex information such that it can be easily interpreted and applied by users with different background knowledge and experience (Alexander et al. 2014). A structured approach to conducting such an assessment with well explained distinguishable indicators or criteria and worked-out examples can facilitate more consistent applications (Candel and Biesbroek 2016). Another challenge with using such qualitative scales is ensuring their transferability in different applications across geographical boundaries or otherwise. For this reason, they need to be applied with care to ensure their appropriate use, such as for collating information, generating discussion, or identifying key areas for improvement. In such a way, a qualitative scale can provide more flexibility to capture the specific nuances in a particular context, making it particularly useful in group settings (Ungar 2003). In comparison, assessments using quantitative data can be more consistently applied to decision-making (e.g. cost-benefit analysis to allocate funding) because they use more easily accessible and verifiable data e.g. census data, model results (Birkmann 2007). For this reason, scales using qualitative data have a different function and thus experience different challenges compared to working with scales that use quantitative data.

As the examples indicate, there is a need to have such a measurement scale to benchmark important conditions to achieve the desired outcomes, such as integration in FRM. In the context of integration in FRM, this bears relevance because the elements of integration identified can each be assessed individually and then combined to represent a degree of integration. Reflecting on the proposed elements of integration as outlined in Sections 2.2 and 2.3, each of these has the potential to be assessed individually using appropriate indicators and can combine to formulate a distinctive degree of integration. The advantages

of using such a qualitative approach to a scaling system provide a more nuanced indication of where they are, and what steps to take to improve their capacity and ability to realise integration in practice. This, together with details on the assessment framework developed within the research are discussed in detail in Chapter 4.

2.5.3 Factors influencing integration in flood risk management

Aside from the key elements of integration, several additional factors were identified from the literature that can influence the degree of integration in FRM. The PAA also recognises that broader social, cultural, political or economic contexts or the physical environment will influence the interactions between dimensions of policy arrangements (Liefferink 2006), thus applicable to the context of this research for the interaction between the key elements of integration in FRM. Some of these physical conditions or factors (e.g. sources of flood risk, geographical boundaries) were identified in Section 2.5.1 to influence the extent of the integration challenges that need to be addressed in FRM. However, these physical factors will also influence the achievable degree of integration. For example, in areas where the administrative boundaries link well with catchment boundaries, it can enable stronger integration for FRM, whereas very complex overlaps between administrative and catchment boundaries make integration more challenging to achieve. For example, in Germany rivers cross multiple federal and state boundaries where decision-making on FRM takes place (Hartmann and Albrecht 2014, Becker 2019).

The political will and leadership of the issue at hand was found to influence the ability and desire to integrate (Birkmann et al. 2010, Jordan and Lenschow 2010). As integration increased in popularity as a concept, it became more present in discourses around policymaking for cross-cutting issues, such as for sustainable development, water resources management and flood risk management. New regulations such as the Floods Directive and Water Framework Directive, help to build momentum to put aspects of integration higher on the agenda. In addition, it is not only integration-specific discourses that can influence integration but, it can also be focused on something related to integration e.g. collaboration. Through discourses, it puts pressure on governments to demonstrate how they are applying integration to manage their cross-cutting problems both nationally and locally. Research has shown that for Environmental Policy Integration (EPI) that the political attention given to the topic is dependent on the leadership of the country, whereby the centre-left governments are more proactive towards EPI in comparison to centre-right governments that reject EPI

or even undo previous progress (Schout and Jordan 2005, Jordan and Lenschow 2010). Furthermore, other connected factors, such as conflicts and war will influence the political space for change and the available resources for FRM (Ristić et al. 2012).

It is well documented that past flood events have led to significant changes around flood risk management offering opportunities to learn about the interdependencies between different sectors and the consequences of lack of action. Such events bring about ‘windows of opportunity’ to influence political willingness, funding availability and an opportunity to engage more intensively with all actors involved (Johnson et al. 2005, Penning-Rowsell and Johnson 2015, Penning-Rowsell et al. 2017). Furthermore, the increasing occurrence of flooding has led to a wider recognition among policymakers of the urgency to address it, especially in light of climate change. However, flood events can also negatively influence integration because of the urgency to repair and recover after floods. For example, in Germany post-flood event funding was spent on heightening embankments, thus encouraging development on the floodplain instead of making room for the river through better spatial planning (Hartmann 2016). The likelihood of flooding happening at the ‘right moment’ (e.g. when funding is cut) is highly dependent on the physical circumstances (seasonality of rainfall patterns, climate change trends; altitude, gradient, the degree of complexity of river systems) which cannot be changed and are difficult to predict, thus acting as an unchangeable external factor (Hegger et al. 2014). These wider factors are expected to influence the urgency, sequencing and priority of different integration challenges within the context of FRM, thus influencing the achievable degree of integration.

2.6 Summary

Overall, this chapter explored the literature to support the development of a framework for assessing integration in FRM (further explained in Chapter 4). The findings demonstrated that theories on new forms of governance, such as collaborative governance (Ansell and Gash 2007, Emerson et al. 2012) support achieving integration in FRM. The Policy Arrangements Approach (PAA) (Arts et al. 2006) was identified as a useful analytical frame for the governance capacity for integration in FRM, helping to distinguish the key elements as the actor relationships and the actor-, rule-, and resource-based mechanisms. The key elements of the realisation of integration in FRM practice were identified as knowledge, FRM and sector-specific policies and interventions and supported by different fields of

literature, for example, (social) learning (Newig et al. 2010), policy coherence (OECD 2015a) and practical guidance on FRM (APFM 2017). These elements of integration were then conceptualised as being dynamically intertwined as illustrated in Figure 2-5. The chapter highlighted the variety of integration challenges, a means to assess the degree of integration in FRM and the influence of external factors. This research contributes to the existing literature on integration by developing a framework for assessing integration in FRM (Chapter 4), applying it different governance contexts (Chapter 5 and 6) and identifying different degrees of integration (Chapter 8). This chapter supports answering research question 1.

Chapter 3 Methodology

This chapter discusses the qualitative research methodology used in this research by introducing the case studies and describing the data collection and analysis methods. The chapter ends by discussing the evaluation of the research and providing background information on the selected case studies.

3.1 Research strategy

The following sections describe the research philosophy, qualitative research approach and the rationale for the selection of the case studies.

3.1.1 Research philosophy

Before beginning to describe the research design, the researcher's philosophy and the system of beliefs that guided the researcher's views on reality are clarified. The combination of ontological and epistemological positions form researcher's assumptions that shape formulation of research questions and guide the research design and implementation (Guba and Lincoln 1994, Bryman 2008, Gray 2014). This research takes a constructivist ontological view about the nature of reality (or constructivism), therefore, assuming that individuals subject to their experiences, can perceive reality in different ways (Saunders et al. 2009). This perspective therefore, contests the assumption that knowledge can be objectively discovered in the pursuit of a universal truth and single reality; instead, acknowledging the role that individuals play in constructing "*the realities in which they participate*" (Charmaz 2006 p. 187). Furthermore, an interpretivist epistemological approach is taken in the context of this research. As such, this assumes that the researcher is part of the research, searching for and interpreting knowledge gained among people, and therefore cannot be fully objective and removed from the research (Saunders et al. 2009, Gray 2014). Interpretivism looks for "*culturally derived and historically situated interpretations of the social life world*" (Crotty 1998 p. 67), thus is interpreted through

different individual mind-sets. For this reason, interpretivist research aims to understand individual's behaviours and actions by developing knowledge on how people interpret their social worlds in a given context (Bryman 2008, Saunders et al. 2009). The selected constructivist ontological and interpretivist epistemological approaches fit well in the context of research on integration in FRM. This is because integration in FRM will be understood and experienced differently given the different perspectives of the participants selected for this study. In this way, multiple actors will have varied interpretations and applications of integration in their realities of FRM.

3.1.2 Qualitative research approach

A qualitative approach is taken in this research following an interpretivism epistemological orientation and constructivism ontological orientation. A qualitative approach is identified as appropriate for this research because it fits with the functions of qualitative research – 1) contextual description of the nature of what exists, 2) explanatory assessment of the reasons for what exists, 3) evaluative appraisal of the effectiveness of what exists, and 4) generative to support development of theories, strategies or actions (Maruster and Gijsenberg 2013). Another major feature of qualitative methods is their ability to 'unpack' issues, to see what they are about or what lies inside, to explore how they are understood by those connected with them and how these understandings inform behaviour and therefore, constitute reality (Ritchie and Lewis 2003).

This research aims to develop contextual information describing the form or nature of what exists for FRM in the different case studies, explanatory information is developed by analysing the reasons for and associations between what exists in the current FRM system, and evaluative information is collated by developing an assessment framework for integration in FRM and applying this. This research aims to generate recommendations for policymakers and practitioners attempting to improve integration within FRM, and to further develop the theory surrounding the concept of integration for other researchers to use. In this way, a qualitative research approach can develop information about the process and outcomes of integration for FRM. This research combines different qualitative methods to develop knowledge on integration in the context of FRM. In-depth interviews are used to gain first-hand experiences and knowledge from those working in, or associated with, the field of FRM, in combination with participant observation to build an understanding of how events or behaviours naturally arise between actors through FRM related meetings.

This qualitative research uses a case study approach. Yin (1994) described the goal of using a case study approach within qualitative studies as a means to contribute to theoretical concepts and ideas. This research does so to develop and test a framework for assessing integration in FRM, and further progress the theoretical knowledge on integration in FRM. Multiple case studies allow for the assessment of integration in different geographical and flood risk governance contexts. The combination of different perspectives on the context or interaction across cases helps to build up a very detailed in-depth understanding of the research topic. A case study approach is deemed necessary for this research because no single perspective can provide a full account or explanation of integration in the context of FRM, and taking multiple case studies helps to build a holistic, comprehensive and contextualised understanding of the situation (Ritchie and Lewis 2003). Furthermore, a case study approach is chosen because it allows the framework for integration to be developed and tested in different flood risk governance arrangements to draw out further insights into the barriers and enablers for integration under different conditions. Further details on the selected case studies is discussed in the next section.

3.1.3 Rational for selection of case studies

The selection of case studies should ensure similarities and differences between them (Yin 1994). The two cases studies selected for this study, Serbia and England had enough in common, both having flood experiences, but also enough differences to draw insights into different applications of the framework – as demonstrated in Table 3-1. Case studies are useful if we understand them not as an isolated example but as embedded within the national picture and a way of teasing out the details and variations at the local level which can sometimes be obscured in national level analysis. The first case study, England, has two study areas within it whereas Serbia focuses on one study area. Both case studies include some analysis at the national level to corroborate the findings at the local level.

Considering the context of the System-Risk project funded under the European Commission, there was an expectation that the case studies would lie within European boundaries. Considering the researcher was based in London, the selection of England was a natural choice, given their ability to access interviewees and attend meetings over a considerable period of time. Although Serbia may not stand out as another obvious choice, it offered a case study with less maturity on developing and implementing FRM policy and practice and thus, a good case to test the frameworks application in a very different cultural,

political and social context than England. In addition, the researcher had access to well-established contacts in the region through a secondment at Deltares within the project.

England's recent advancements in flood risk governance after severe flooding, and particularly on aspects of cross-sectoral integration, demonstrate its forward-thinking and openness to progressing FRM. Similarly, Serbia showed strong signs of willingness to become more disaster resilient after significant flood events, however, lags behind in progress due to war/conflict, and its subsequent poor economic state. These two divergent case studies within the European context allowed for different insights to be gained from the development and application of the framework and increase its applicability to a wider range of governance contexts. The English case study functioned well to develop and refine the framework because of the wealth of information available and the feasibility to capture in-depth data. In comparison, the Serbian case study offered a good approach to test the framework and further improve it. Further details on the case studies is explained in Section 3.5.

Table 3-1 Justification for selection of case studies – England and Serbia

Criteria	England	Serbia
<i>Flood experience</i>	High - regular flood events e.g. in Yorkshire in 2007, 2012, 2014, 2015, 2019/20 and in 1998 in the Anglian region	High - significant flood events in 2014, 2016
<i>Cultural context</i>	Move towards collaborative governance e.g. both the Yorkshire and Anglian regions display multiple local (FRM) partnerships	Hierarchical organisational culture
<i>Governance approach</i>	Focus on local and regional management of flood risk	New legislation on FRM and Disaster Risk Reduction (DRR) transferring responsibilities to the local level
<i>Experience with integration in FRM</i>	Medium to high e.g. integration present in Natural Flood Management in Yorkshire whereas Yorkshire and Anglian regions have growing interest in FRM integration with economic growth	Low e.g. only starting to align with Floods Directive
<i>Spending on FRM</i>	Medium to high - £2.6 billion 6-year capital investment programme	Low - highly dependent on donor investment due to poor economy (resulting from conflict)

Within these two case studies, specific study areas were selected. A focus on the local and regional levels was completed given the likelihood for integration to manifest at this spatial

level for FRM. For Serbia, the choice of a local study area was more straightforward, given the local contacts with the municipality of Kraljevo, their recent experience of flooding and well recognised efforts to implement new regulations. In comparison, selecting areas within England was a more complex task, given the large differences in both the catchment characteristics and how flood risk is managed across the different regions in England. For this reason, the starting point for identifying study areas within England was to attend the Regional Flood and Coastal Committees (RFCC) and associated partnership meetings in different regions before deciding on where to focus. There are 12 RFCC regions, as shown in Figure 3-1, five of which were attended - Thames, Anglian Great Ouse², Anglian Eastern, Wessex and Yorkshire. The Southern, South-West, and Anglian Eastern were not visited as they were expected to have more concentration on coastal issues which was not the focus of this study. Due to logistical constraints it was not possible to attend the Northwest, Northumbria, Severn and Wye and Trent meetings, but their public meeting agenda and minutes were reviewed instead. However, at a later stage in the research the Northwest RFCC was attended. This process led to the decision to select two RFCC areas as the regions of focus in the English case – Yorkshire and Anglian Great Ouse.

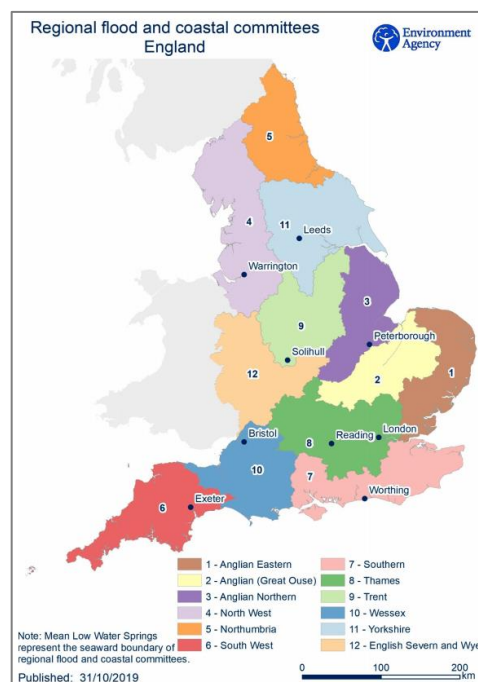


Figure 3-1 Regional Flood and Coastal Committee Areas (Environment Agency 2019a)

² The Anglian Great Ouse RFCC was called Anglian Central at the time of the research but is updated to reflect the change in 2019.

Considering that these regions are quite large, one Lead Local Flood Authority (LLFA) was selected in each to focus the local level research. The LLFA boundary was selected because this represents the new structure that has been tasked to manage local flood risk since the implementation of the Flood and Water Management Act (2010), thus offering a unique unit of analysis where limited previous research had been conducted. It also offered a realistic unit of analysis to research the relationships between the different FRM professionals within that boundary and those which overlap, rather than analysing all the relationships across the region. The LLFAs selected included Cambridgeshire LLFA, which mainly sits in the Anglian Great Ouse RFCC region but also dips into the Anglian Northern region and falls within the Anglian river basin district, and Leeds LLFA, which sits in the Yorkshire RFCC in the Humber river basin district. Both of these boundaries are shown in Figure 3-2.

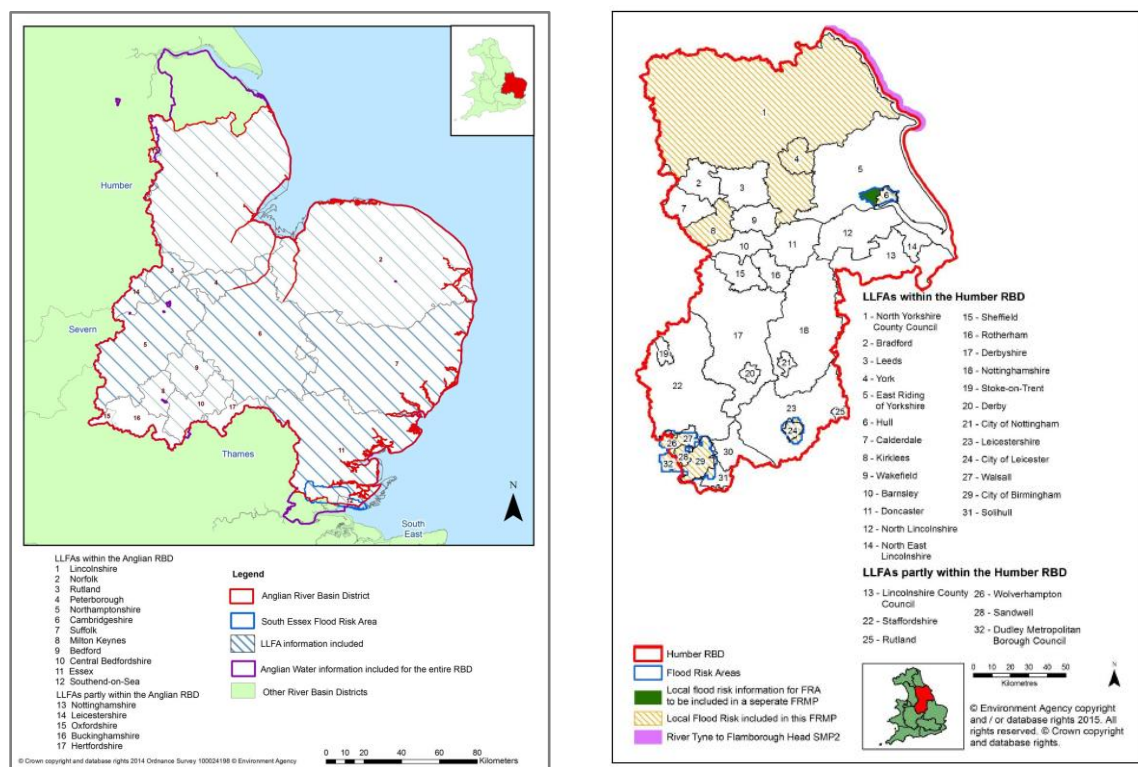


Figure 3-2 LLFAs within the Anglian (left) and Humber (right) river basin districts (Environment Agency 2016a, 2016b).

Overall, importance was given to select LLFAs with different characteristics so as to learn more about integration in FRM for different contexts. The following are examples: the differences between administrative structures, physical catchment characteristics, experience of floods, drivers for economic growth and presence of local FRM partnerships. The criteria and associated reasoning used to select them is outlined in Table 3-2.

The overlap between the LLFA boundaries and wider boundaries were also considered because some actors and their associated partnerships operate within different regional or local boundaries, for example water company boundaries, Local Enterprise Partnerships and Local Resilience Forums. In this way, although the LLFA boundary was the focus of the research, many of the interviewees had different working boundaries.

Table 3-2 Criteria for study area selection in England – Leeds and Cambridgeshire LLFAs

Criteria	Explanation
<i>Type of catchment</i>	<ul style="list-style-type: none"> Cambridgeshire is situated in a very low lying pumped catchment. The Nene and the Great Ouse are the main rivers. It is a predominately rural area driven by agricultural activities. Leeds is situated on the River Aire and sits within a small portion of the River Calder catchment. It is an urbanised area.
<i>Level of flood experience</i>	<ul style="list-style-type: none"> Cambridgeshire is very well protected with the levee system in place and has not received a significant flood since Easter 1998. Leeds experienced a lot of floods, in particular the 2015 Boxing Day floods.
<i>Level of development/ growth</i>	<ul style="list-style-type: none"> Despite the differences in the catchment characteristics, both Cambridgeshire and Leeds are experiencing pressure for housing and infrastructure growth. Leeds is one of the fastest growing economies in England. There are huge plans to expand the Cambridge Oxford growth arc as a knowledge intensive cluster that secures homes and jobs – aiming to build 1 million new homes in the area by 2050 (MHCLG 2019a).
<i>Presence of local/ sub-regional partnerships</i>	<ul style="list-style-type: none"> Cambridgeshire FRM partnership was recommended as being a good example of partnership working during conversations at an RFCC meeting. In Yorkshire, because there are so many LLFAs, they are grouped sub-regionally into North, South, East and West Yorkshire. Leeds sits within West Yorkshire FRM Partnership. Most LLFAs additionally have their own local partnership structure. In Leeds this is named the Flood Resilience Partnership Board.
<i>Administrative structure</i>	<ul style="list-style-type: none"> Leeds is a metropolitan council which acts as a unitary authority whereby all council services are provided under one roof. Cambridgeshire is a two-tier authority with a county council (LLFA, and highways authority) and underneath there are 7 district councils (planning authorities).

3.2 Research design

This research seeks to develop a framework and apply it in such a way that it can have a positive and reasonably direct influence on FRM in practice, an approach advocated by other researchers studying collaboration, for example Huxham and Vangen (2000a). This research was designed in a way to support the development of a framework for assessing integration in FRM, which evolved in different phases throughout the research. Figure 3-3 captures this iterative process whereby the initial conceptual framework was prepared based

on a literature review, then further developed using the data collected through interviews and participant observation in England and updated based on the interview data collected in Serbia. The final framework was then cross-checked based on the verification interviews and supported by literature where possible. Each of the framework development phases are discussed further herein.

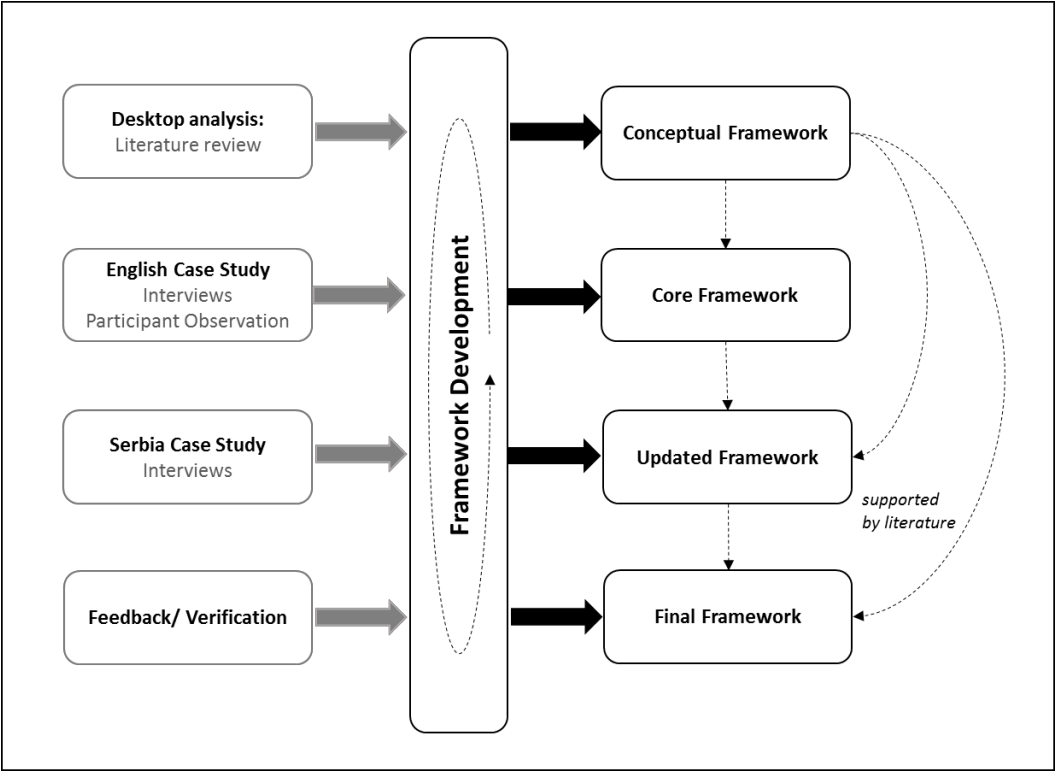


Figure 3-3 Staged development of the framework to assess integration in FRM

Figure 3-4 presents an overview of the timing of each of the different data collection methods used during the 3-year research study. These data collection methods helped to assess integration in the context of FRM because information could be directly collected from a wide range of actors through interviews, meeting observation and policy analysis.

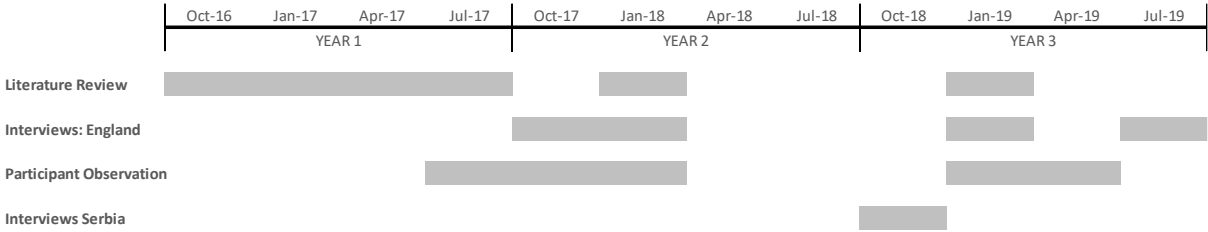


Figure 3-4 Overview of the timing of each of the data collection methods

A desktop review of literature and policy analysis was a crucial first step of this research. In the early stages of the research, the literature review (as outlined in Chapter 2) was used to conceptualise integration in the context of FRM and develop the structure for a framework by identifying the key elements and their associated indicators, as shown in Figure 3-3. In addition to the scientific literature, policy documents (i.e. governmental documents such as plans, meeting minutes and guidance documents) were reviewed as part of the desktop review. This was deemed an important step to understand the more recent changes in FRM arrangements which were only available in meeting minutes or agendas. This secondary information was also useful for identifying interviewees (e.g. from meeting minutes), clarifying information provided during the interviews and to search for more detailed information briefly raised during the interviews. For this reason, the literature also supported later stages of the research for both case studies, as shown in Figure 3-4. Additionally, the development of the final framework was also supported by returning to the literature, as shown in Figure 3-3.

In-depth interviews were used as the main data collection method in this research. Intensive or depth interviewing is a qualitative method of finding out about people's experiences, thoughts and feelings (Schutt 2006) by verbally communicating information between participants and an interviewer in an interactive process. This method was chosen as it enabled the researcher to discuss topics relevant to the interviewee in a flexible way in their own context. Additionally, it allowed the researcher to engage actively with the subjects by listening to answers and importantly being able to ask follow-up questions for further explanation and to bring meaning to their answers or comments. In such a way, each interview is unique due to the interaction between interviewer and interviewee (Fontana and Frey 2000). The in-depth interviews followed a *semi-structured* format meaning that it is necessary to obtain certain specified information but does not have an interview schedule specifying the manner in which the information is to be obtained. The interview questions for the in-depth interviews were mainly open-ended to gather context specific information. A *list of topics or questions* was prepared for guidance but was not always followed in full. This flexibility allowed the research to ask different participants varied topics or questions based on their experience and knowledge, explained further in Section 3.2.1. The method also allowed for the participants to reveal new insights into integration in FRM that were not thought of when developing the interview guide. As shown in Figure 3-4 and Figure 3-3, these interviews were conducted first for the English case study, to develop the core

framework, which was then further updated based on the data collected in Serbia. Finally, interviews were used to gain feedback from actors to generate the final framework, as discussed in more depth in Section 3.4.1.

Participant observation was used as an additional data collection tool for the English case study to inform the development of the framework, as shown in Figure 3-4 and Figure 3-3. Participant observation is the process of the researcher observing and documenting actions, interactions or events that occur within the study population or its organisational setting (Ritchie and Lewis 2003). This allows the researcher “*direct experiential and observational access to the insiders world of meaning*” (Jorgensen 1989 p. 15) and thus, gaining additional insights by experiencing the interactions themselves and increasing their ability to capture new interactions as they arise. Additionally, observation is identified as a particularly useful approach when studying a multi-actor context, where understanding non-verbal communications is likely to be important or where the behavioural consequences of events form a focal point of study (Ritchie and Lewis 2003). It is generally recognised that participant observation also includes gathering of additional data through listening and engaging in conversations and collecting documents where relevant (Bryman 2008). Furthermore, Williams (2003) asserts that observation can be more objective than other types of data collection because it is driven by the activities being directly observed.

For this research, observation during FRM related meetings was deemed an appropriate method to supplement the interviews because it allowed the researcher to embed themselves in the natural multi-actor working environment of FRM. The interviews could only give the perspective of individual participants in comparison to participant observation where the researcher can directly observe how actors communicate with one another. In such a way, helping to assess the degree to which a wider range of actors are supporting integration in FRM. Participant observation was conducted at local, regional and national FRM related meetings and events to gain deeper insights into stakeholder interaction, the current issues and interests of stakeholders and their decision-making processes (discussed further in Section 3.2.2). Attending these meetings presented the opportunity to directly observe FRM professionals in their roles, whilst also enabling contacts to be secured and rapport built with individuals who would later become interviewees. Furthermore, being able to observe the interactions between actors at the local, regional and national level at different stages throughout the research provided an opportunity to cross-check information collected during the interviews and/or generate new topics for discussion.

3.2.1 Interview participant selection

Purposive sampling is a non-probability form of sampling used to identify participants relevant to the research questions, thus having specific research goals in mind (Bryman 2008). The interviewees were selected using purposive sampling on the basis of their involvement in FRM for the English and Serbian case studies. The participant inclusion/exclusion criteria were based on their knowledge of FRM and their role within an FRM or sector-specific organisation. Initially based on document analysis a list of potential actors was identified, as recommended by Reed et al. (2009). The aim was to interview all the key roles within each case.

For the English case study, the interviews at the local level took place between November 2017 and February 2018, and at the national level between January and February 2019, as illustrated in Figure 3-4. Interviews were conducted in blocks to quickly arrange meetings one after another making sure that the research kept moving and sustained interest among interviewees. To identify the interviewees, initially contact was made through the first observations the RFCC meetings, which led to identifying key contacts at the LLFA and EA. This interaction then led to an invitation to join the Cambridgeshire Flood Risk Management Partnership. This allowed the researcher to present the research study during the meeting and ask questions to specific members during the coffee and lunch breaks. These informal conversations helped to build rapport with potential interviewees and gain their interest in participating. When contact was made, a brief two-page document outlining the research objectives was shared by email to follow up with potential interviewees. Once a baseline of interviewees was identified a *snowballing technique* was utilised to identify further participants through interviewees and actors met during meeting observations.

For the Serbian case study, a different approach was taken given the requirement to travel internationally to collect data. For this reason, the research took place in two stages. Firstly, between 14th and 17th August 2018 when the Head of the Department of Civil Protection (DCP) Kraljevo visited Deltares, in Delft the Netherlands³. Secondly, field work in Serbia took place between the 6th and 15th of September 2018 at the national and local level in Kraljevo. Some national level interviews were arranged before travelling, through contacts

³ This was completed during the researcher's secondment at Deltares as part of the System-Risk project.

identified by the DCP Kraljevo, however, the majority of the local interviews were arranged during the visit⁴. Similarly, the snowballing technique was used with support of the DCP.

Deciding on the ‘correct’ number of interviews is a debated issue in qualitative research. Overall, the approach taken in this research was to reach the point of theoretical saturation whereby no additional significant information was being captured during the interviews (Charmaz 2006, Bryman 2008). For the English case study 18 interviews were completed for the Cambridgeshire study area, including some contextual interviews from surrounding areas within the Anglian region. For the Leeds study area, 14 interviews were conducted. These included interviews with professionals working directly or indirectly on FRM e.g. Lead Local Flood Authority flood risk managers, Environment Agency staff and catchment partnership hosts. In cases where it was difficult to access the same variety of actors in both study areas it was deemed acceptable to have them from one study area. Additionally, 14 national level interviews were conducted to supplement and validate the findings at the local and regional levels. Each interview took between one and two hours to complete. Appendix A presents the anonymised details of those interviewed for the English case and dates of the interviews. On some occasions, additional members of staff from the same organisation were present in the interview as the initial interviewee felt it was appropriate to invite others. Such cases are considered as one interview in this research but are labelled as a, b, c. etc. in Appendix A. Furthermore, some interviewees had previous experience in other organisations which was relevant to integration in FRM and thus they could represent both roles if they wished to do so. Approximately, 55 hours of interview data was collected for the national and local interviews for the English case study. For the Serbian case study, 19 participants were interviewed including representatives from the key agencies responsible for FRM both nationally and locally in Kraljevo, a full list is presented in Appendix B. In total, 17 hours of interviews were completed for the Serbian case study. The interviews were mainly conducted in English and a translator was used for some local level interviews where the participants were not as conversant in English.

The interviewees are identified using the following format: LD-01, LD-02 (etc.) for the Leeds study area, CB-01, CB-02 (etc.) for the Cambridgeshire study area and SB-01, SB-

⁴ Furthermore, the field visit aligned with the Understanding Risk Balkans conference, in which the researcher organised an event for young professionals, which was used as an opportunity to interview additional senior professionals during the breaks.

02 (etc.) for the Serbian case study. Furthermore, due to the changing nature of activities on FRM, the dates of each interview are presented in Appendix A (England) and Appendix B (Serbia) demonstrating the relevance of the information provided at the time of the interview.

3.2.2 Observation meetings selection

Participant observation was only completed for the English case study, as the limited time and language barriers made it an infeasible data collection method for Serbia. For the English case study, participant observation was completed at the beginning of the study to help in scoping out the study areas, intensively during the time of the interviews, and intermittently during the rest of the study as opportunities arose to participate, as illustrated in Figure 3-4.

The meetings and events selected for observation were based on the analysis of the existing networks through which FRM and sector-specific professionals attend at local, regional and national levels. Some meetings were attended progressively (e.g. RFCCs) and where possible the meeting minutes were collated for meetings that could not be attended. Overall, in Leeds it was found to be more difficult to attend meetings due to tighter administrative restrictions. For some of these meetings it was difficult to get the chair to approve a researcher's presence; however, once the code of ethics was explained the chair was more open to the observation exercise. In total, 27 meetings and events were attended covering approximately 140 hours of observation. These are listed in full in Appendix C (labelled from PO-1 to PO-27) and summarised below:

- FRM specific: National Flood and Coastal Erosion Risk Management Strategy Working Group, National FCERM Stakeholder Forum, Regional Flood and Coastal Committees (and sub working groups), sub-regional/Local flood risk management partnerships;
- Emergency management: Local Resilience Forum working group meetings;
- Housing and infrastructure growth: Local Authority Scrutiny Boards, Combined Authority meetings, Cambridge-Oxford Arc flood meeting, Green-Blue Infrastructure Strategy Leeds;
- Other events/ conferences: Flood and Coast Conference, Internal Drainage Board conference, CIWEM flood and water event.

These mainly included meetings relevant to the Cambridgeshire and Leeds area, however, upon recommendation, additional meetings in the neighbouring regions were attended to gain further insights on FRM e.g. Lincolnshire Strategic Flood Risk and Water Management Strategy Group and Northwest RFCC. This was recommended by interviewees to help capture the local variances in the actors' ability to realise integration in practice given their varied exposure to floods and their governance capacities for integration in FRM. Some of the meetings were primarily focusing on FRM issues e.g. RFCCs and local FRM partnerships, whereas others were more focused on specific issues like green-blue infrastructure provision, county council committee meetings on transport (where flood risk is one of the issues under scrutiny), and the Local Resilience Forum, Severe Weather Working group. Such a variety was ensured in order to observe how FRM professionals are working amongst more familiar FRM professionals and sector-specific professionals. Some of the events were open to the public for observation, e.g. RFCCs, combined authority and council meetings, whereas others were invitation only, e.g. Programme and Investment sub-committee meeting and Cambridge-Oxford Arc Flood meeting. Furthermore, some conferences were selected for registration upon recommendations from interviewees. During the majority of the meetings the researcher acted in full observation mode, however, in certain events engagement was welcomed.

Further to observation at meetings, the researcher took part in the 'Roles and Responsibilities' Working Group for the development of the new *National Flood and Coastal Erosion Risk Management (FCERM) Strategy for England* led by the Environment Agency. This involved attending webinar and in-person meetings with other key FRM professionals and some degree of participation was expected, rather than just observing. Following on from that engagement the researcher attended a consultation meeting and submitted a formal response to the public consultation on the draft National FCERM Strategy (Environment Agency 2019b).

Another source of data for the research, which is assumed to fall within the bounds of participant observation was the organisation and moderation of a panel session at the *Flood and Coast 2019 Conference*. This was possible as the researcher was a member of the Next Generation Committee for the Flood and Coast event in June 2019. The researcher co-chaired the event along with an RFCC chair with panellists representing, an engineering consultancy company, the Environment Agency, Anglian Water, a Lead Local Flood Authority, and a community flood action group (see Figure 3-5). The agenda for panel was

designed in a way that it fed into the analysis, primarily for Chapter 7, to capture further insights into the skills and competencies of boundary spanning roles and their influence on integration in FRM. The panel session was recorded and subsequently transcribed for this purpose.



Figure 3-5 Panel session at the Flood and Coast Conference 2019

3.2.3 Secondary data selection for policy analysis

A selection of policies and plans, guidance documents and meeting minutes were reviewed as part of the research, in some cases to validate and others to compliment the data collected through the interviews and participant observation methods. This included FRM specific plans (n=15) e.g. Regional Flood Risk Management Plans, Local Flood Risk Management Strategies and sector-specific plans (n=20) e.g. National 25 Year Environment Plan, Regional River Basin Management Plans, and Local (development) Plans. These plans were selected based on those identified in the interviews and meetings both locally and nationally, and to ensure broad coverage of sectors. Furthermore, additional guidance documents, available meeting minutes and associated documents (n=35) were reviewed. Some documents were obtained directly from interviewees, or through the process of attending meetings, and others were found publicly online. These policy documents were reviewed before interviews for preparation and after the interviews to cross-check the information gained when necessary. In such a way, this part of the research took place alongside the interviews, as illustrated in Figure 3-4.

3.2.4 Research materials and ethics

The materials used to conduct this research included an interview guide for the interviews. The guide used at the local level in the English case study can be found in Appendix D. The interview guide varied for the national interviews depending on the background of the individual and their ability to answer specific questions about the findings from the local level and is therefore not included. Multiple notebooks were used to capture the notes from each of the interviews and participant observation. For the Serbian case study, the research had progressed significantly based on the findings from the English case study and therefore the questions were more specific to the assessment framework developed, as demonstrated in Figure 3-3. Similarly, the interviews followed an interview guide (as shown in Appendix E) and were specifically designed to be as interactive as possible. Considering the limited familiarity of the researcher with the flood risk governance context in Serbia, this approach allowed the relationships between different stakeholders, mechanisms that influence them and the knowledge, policies and interventions they operate within, to be more easily identified and discussed – see Figure 3-6. The materials used included different coloured sticky notes to represent different groups of actors. Furthermore, the interactive nature helped to break down the language barrier in some cases. However, this approach was found to be less successful in certain interviews due to time constraints or a lack of interest. In those cases, the maps were drawn up directly after the interviews by the researcher.

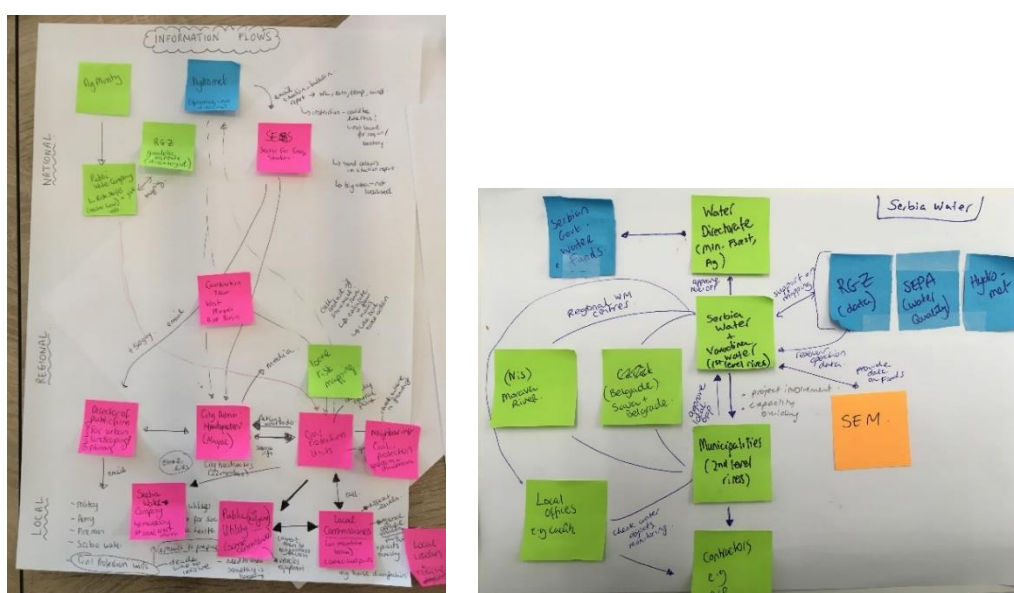


Figure 3-6 Interactive stakeholder analysis – actor analysis and information flows - with the representatives from Kraljevo Dept. Civil Protection (left) and Serbia Water (right)

This research follows the ethical guidelines of Middlesex University in line with the Social Research Association (SRA 2003). Informed consent was obtained from participants as part of the research. See Appendix F for the copy of the consent form and Appendix G for the participant information sheet used during the research for both the in-depth interviews and for participant observation meetings. It was explained that participants had a right to withdraw at any time during the research process. All information (transcripts, audio and comments) collected about participants during the course of the research was kept strictly confidential to all external parties (including other respondents) beyond the researcher and supervision team, thus in compliance with the General Data Protection Regulation (2016). All of the data used from the respondents had their name removed so that they could not be recognised from it. Both direct attribution (if comments are linked to a name or a specific role) and indirect (by reference to a collection of characteristics that might identify an individual or small group) was avoided. However, in some cases the role of the individual was relevant for the analysis e.g. a partnership chair or LLFA manager. This was particularly important for Chapter 7 which identifies different boundary spanning roles that enable integration in FRM. In these cases, all quotes used were cross-checked with the respondents and approval for use was gained. These are noted with an asterisk in Appendix A and B. Additionally, all quotes presented in this study from the interviews are not statements on behalf of the interviewee's organisation but instead they represent the opinions and experiences of the individual interviewees. Furthermore, given the dynamic nature of FRM, the quotes represent the views of the interviewees for the date at which they were collected.

3.3 Data analysis

Braun and Clark (2006) suggest that thematic analysis involves an iterative approach, familiarisation with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Within this research, thematic analysis was used to analyse the data collected. As explained in Section 3.2 and presented in Figure 3-3, the framework developed in this research was completed in stages aligned with literature review and the data collection from the case studies.

For this reason, thematic analysis offered a flexible and iterative approach to analyse the data to develop a framework that is supported by the literature and test it in each of the case studies. The conceptual framework was developed based on literature and used to develop

the interview guide for the English case study, a process which is supported by thematic analysis (Fereday and Muir-Cochrane 2006). However, the data collected from the English case study was analysed for two purposes. Firstly, to further develop and refine the key elements and indicators of a generic framework that could be applied in other contexts, thus testing the *relevance* of the data. For example, additional indicators emerged based on patterns in the data and were then cross-checked with the literature, thus an interactive/cyclical process between the data and the literature, as presented in Figure 3-3, supported by thematic analysis (Fereday and Muir-Cochrane 2006). Secondly, the data was analysed to test the *performance* of the key elements and indicators of integration in FRM in both case studies. In such a way, once the final framework was completed, it was applied using the data previously collected in both case studies. Overall, the data collected from the case studies was analysed with two purposes in mind 1) develop generic framework to assess integration in FRM and 2) apply it in each of the case studies. The following sections explain the transcription and coding processes and how they differed to meet both purposes.

3.3.1 Transcription and note-taking processes

All interviews were recorded, and subsequently transcribed word-for-word into documents, however, pauses were not included in the transcription. Notes were also taken in notebooks during the interviews to help capture key messages and to facilitate preparation for the following meetings. For the interviews in England and Serbia, transcription process started after the interviews were completed. However, for the national interviews (and verification interviews – discussed in Section 3.4.1) in England the transcription process took place as soon as possible after the interview. This was then followed by the coding process.

For the data collected through participant observation, notes were taken during the meetings or events in field work notebooks. These notes included direct quotes and information collected directly from the meetings on one side of the notebook and personal observations (e.g. how people interacted, tone of voice), and other observations were written on the other side of the notebook (e.g. content of the meeting). For each event, a summary of the notes was typed into a document and coded to supplement the data collected from the interview analysis. They were coded in the same way as the data collected from the interviews, which is explained further in the following section.

3.3.2 Coding analysis technique

Once the transcripts were prepared with the primary data, the coding process was undertaken. This research primarily followed an inductive approach to coding the data because the study did not set out to prove a theory based on the data collected i.e. deductive approach (Kitchin and Tate 2000, Saunders et al. 2009). However, the research did start with a conceptual framework informed by the literature review and therefore does utilise some aspects of a deductive approach. The coding facilitated the process of organising the data in a systematic way so that it could be “*segregated, grouped, regrouped and relinked in order to consolidate meaning and explanation*” (Grbich 2012 p. 21). Considering the staged development of the framework coding was an iterative process, constantly revised and revisited through analysis (Bryman 2008). NVivo (QSR International NVivo Version 11 Software) was used to store, organise and support the data analysis. This was complemented with paper-based coding using printed transcripts and highlighters to further embed the researcher in the data. The coding process followed to develop the framework and apply it, are explained in the following sub-sections.

Analysis to develop the assessment framework

The data was first collected from the English case study and was therefore coded first to support the development of the framework, as depicted in Figure 3-4. First cycle coding was used to initially analyse this data and helped to identify the relevance of the elements and indicators recognised within the conceptual framework. As the English case study had two study areas – Cambridgeshire and Leeds, first cycle coding was completed first for the Cambridgeshire study area to identify the wide range of codes in the data. Second cycle coding then helped to classify, prioritise, synthesise the codes (Saldana 2013). Next, the first cycle coding for the Leeds study area was completed using the updated codes from Cambridgeshire, followed by second cycle coding. The notes from the observation meetings were also coded in the same NVivo file.

During this coding process for both case studies, two types of codes were collected to organise the data to support the iterative development of the framework, and subsequently to test it, as demonstrated in Figure 3-7. Firstly, *element-based codes* collated and structured the data on each of the key elements of integration (as explained in Chapter 2). For example, each of the bonding, bridging and linking relationships between actors and each of the different types of influencing mechanisms. This was an important step because of the

density of the data and the need to be able to easily identify and find different parts of the data. The second type of codes collated were *indicator-based codes* which were coded with the aim to identify and/or refine assessment indicators for each of the elements of the framework. These were identified by interviewees as challenges, barriers or enablers for achieving integration in FRM. The codes were then grouped, merged or removed as part of the coding refinement process (second cycle coding). More details on the hierarchy of the element and indicator-based codes can be found in Appendix I.

Considering the wide range of codes that were emerging, it was decided that in order to keep the depth of codes easily accessible, these were not further refined (or finalised) in Nvivo, as shown in Figure 3-7. Instead the analysis continued ‘on paper’ or in documents. Furthermore, through the writing process (e.g. transfer report, preparing publications), the key elements and indicators were further refined to make the framework as functional as possible. For example, there were initially five indicators selected for relationship strength which were then reduced to two indicators in the final framework.

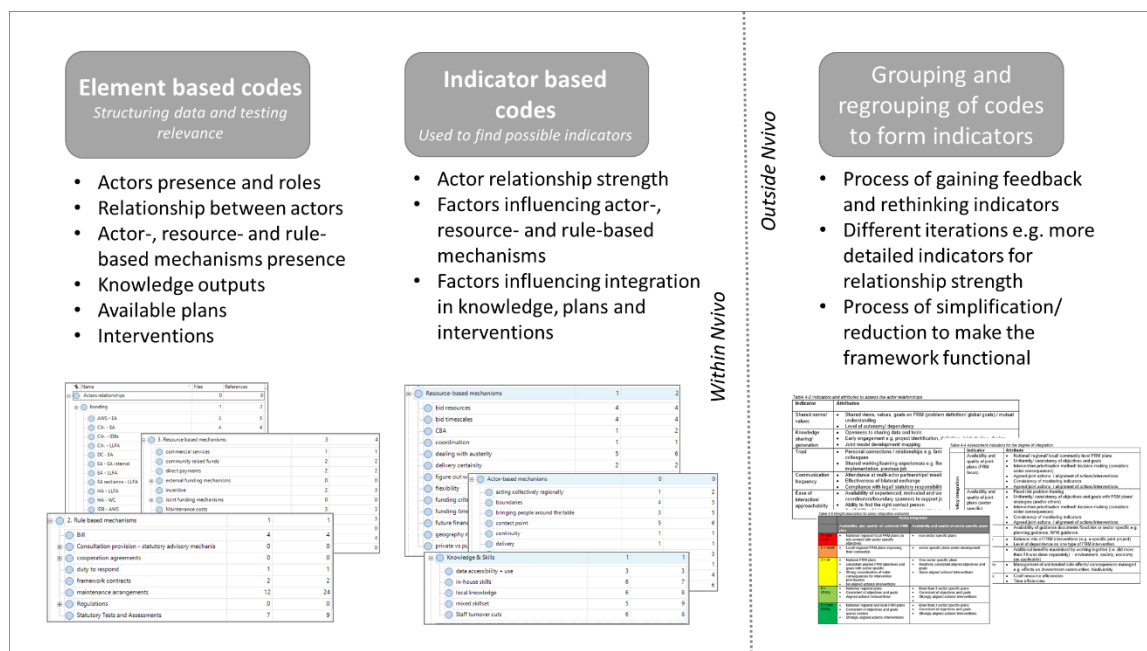


Figure 3-7 Process of coding in NVivo to develop the framework indicators

The data collected from the Serbian case study was coded in a similar way to the English case study using element and indicator-based codes once the structure of the core framework emerged. This data helped to inform further refining of the indicators of the framework. Upon selection of the final indicators from the data, the empirical results were then cross-

checked to identify any supporting literature or theoretical concepts, to demonstrate rigorous results (Fereday and Muir-Cochrane 2006).

Once the elements and indicators were developed, a scale was then produced to identify the strength of each element. This involved the following steps:

- Identifying the upper, mid and lower fixed points on the scale for the elements i.e. strong, moderate and weak strength;
- Developing a qualitative description for each of the indicators at each of the measurement points. These were estimated based on;
 - o logical reasoning, for example, strong equates to most actors, moderate to some actors and low represents few or no actors;
 - o expert/personal judgement from the data analysis was used to distinguish which indicators were more evident than others for different strengths. For example, efficiencies and managed trade-offs between interventions were recognised as easier to achieve than synergies and was considered in the qualitative descriptions.
- Merging of the indicator descriptions to generate a description for a strong, moderate and weak point on the scale. Qualitative descriptions were not developed for cases when assessments fall in-between the fixed points e.g. strong to moderate strength, to enable more flexibility in the assessment.

Finally, the data collected from the evaluation process (discussed further in Section 3.4) was used to gain feedback and finalise the assessment framework. This acted as a means to triangulate the data and ensured that theoretical saturation was reached (Mason 1996). To distinguish between the development of the framework and its application with the thesis, Chapter 4 presents the framework using data collected from the national level and outside the study areas to avoid repetition during the application of the framework (presented in Chapter 5). This approach also helps to demonstrate the applicability of the framework indicators based on the data collected outside the study areas.

Analysis to apply the framework

Once the framework was finalised after the data was collected in both case studies, it was applied to each case study using the data coded in NVivo. At this stage of the research, the *performance* of each of the indicators was assessed instead of their *relevance* (as required

for developing the framework). The data stored in NVivo was used to complete the assessment of integration in FRM for both cases. In cases where the codes were not directly connected with the finalised indicators of the framework, multiple relevant codes were reviewed to generate the assessment.

To conduct the assessment of the strength of each element of integration, the coded data was reviewed for the appropriate indicators in Nvivo. Firstly, taking one element each indicator was assessed to identify if it fit better with strong, medium or weak strength. Secondly, this was completed for each indicator in each element. For some indicators, an assessment was completed for individual components e.g. specific bridging actors or rule-based mechanisms to generate an average. In cases where some indicators fitted strong and some fitted medium strength they were identified as strong to medium. This process was completed for each element of the framework, such that an integration profile emerges (further explained in Section 4.1).

Furthermore, considering the different integration challenges for FRM that emerged from the evidence in the English application, the analysis was split into multiple applications. This allowed for the specific factors influencing or hindering integration to emerge from each challenge and enable a comparison across the applications of the framework – as presented in Chapter 5. In comparison, the Serbian case demonstrated a different integration challenge in FRM where it is transitioning from a focus on flood response to FRM. Furthermore, in Serbia the framework was additionally applied to represent the future progression of integration in FRM for the short and medium to long-term, due to the ongoing activities related to FRM – as presented in Chapter 6.

Analysis to characterise the degrees of integration

Once the profiles were generated for each of the applications of the framework, they were used to identify a more nuanced indication of the degree of integration based on the relative strength of each of the key elements. In such a way, the analysis revealed which components of the key elements were more difficult to achieve. Similarly, to the scale of strength for each element, the scale of integration was split into measurement points called degrees of integration – high, intermediate, low and minimal. These four degrees were selected based on the data analysis which revealed enough differences between each of the degrees of integration. Furthermore, selecting four degrees made it more practical to apply. Again, a

qualitative description of each of the elements for each degree of integration was generated. This is further explained in Section 8.2.

Analysis to identify wider themes

Broader themes related to integration in FRM emerged from the data during and after the application of the framework, as presented in Figure 3-8. The existing codes within NVivo for both case studies were reviewed to identify specific data related to the emerging themes. Within the application of the framework in Serbia and England (presented in Chapters 5 and 6), the importance of the interactions between the elements of integration emerged and the key barriers and enablers (sometimes connected to specific indicators) for integration in FRM. Furthermore, the different types of individual boundary spanning roles and how they interact with different mechanisms emerged as a theme (presented in Chapter 7). Finally, throughout the applications the dynamic nature of integration in FRM and how different degrees of integration can be achieved over time was identified (presented in Chapter 8). Similarly to the development of the framework, these themes were supported by literature to demonstrate rigorous results (Fereday and Muir-Cochrane 2006).

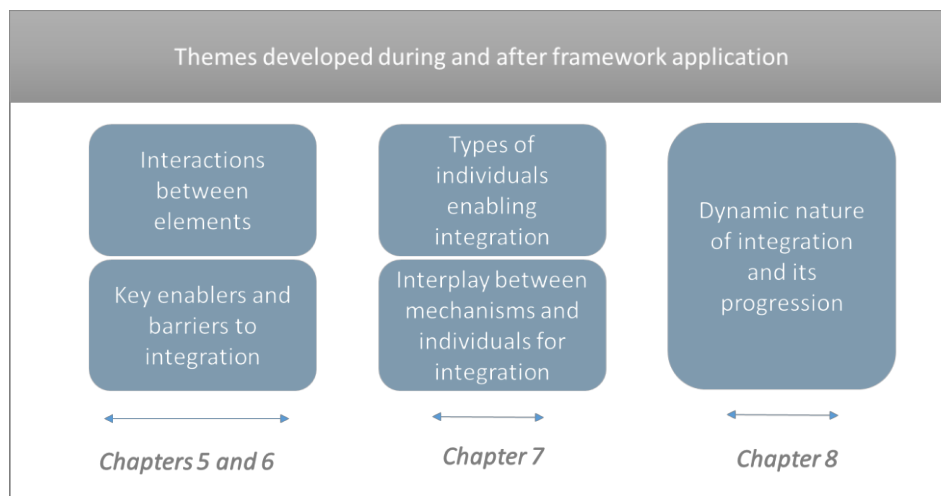


Figure 3-8 Themes emerging from the data upon framework application

3.3.3 Policy analysis of secondary data

The secondary data (policies, plans, meeting minutes, guidance documents) was used to support the primary data collected but was not coded. These were reviewed by reading the documents and highlighting important or useful components, which could then support the different emerging themes identified from the primary data. An in-depth policy/document

analysis, which would include such detailed coding of the documents was not completed, as this was deemed outside the scope of the study. Although it was tempting to delve into all the details presented within these policy documents, it was decided that the depth of primary data collected provided sufficient empirical evidence to develop and apply the framework.

3.4 Research evaluation

An important aspect of conducting qualitative research is the reliability of the data (Mason 1996). The next stage of the research involved reflecting on the reliability of the data collection and analysis processes, thus evaluating the research. Important aspects of this are the credibility of the data (i.e. confidence in the truth of the findings), dependability, transferability, and confirmability (i.e. the degree of neutrality) (Lincoln and Guba 1985). The credibility and dependability of the findings was ensured by using triangulation to check that findings were rich, robust, comprehensive and well-developed (Lincoln and Guba 1985). This was completed through verification checks with FRM professionals at multiple phases of the research and is explained in Section 3.4.1. The transferability of the research was ensured by detailing the description of the research context (see Section 3.5) and the researcher's positionality (see Section 3.4.2), also supporting the transparency of the research.

3.4.1 Feedback verification process

To ensure the data collected was accurate, as well as the interpretations, a series of verification checks were put in place throughout the research, split into three phases, as illustrated in Figure 3-9. Each phase provided input on different aspects of the research and different methods were used to collate feedback at each stage. This process also helped to capture the ongoing changes to FRM in England. The verification process included, an interactive workshop, in-depth interviews (including member checking) and written feedback e.g. from journal reviewers. Member checking is an approach to test data interpretations and conclusions with interviewees, collect additional supporting information and to summarise preliminary findings (Lincoln and Guba 1985). Member checking was used in the context of this research; however, it was extended to include wider representatives of FRM professionals outside of the original interviewees.

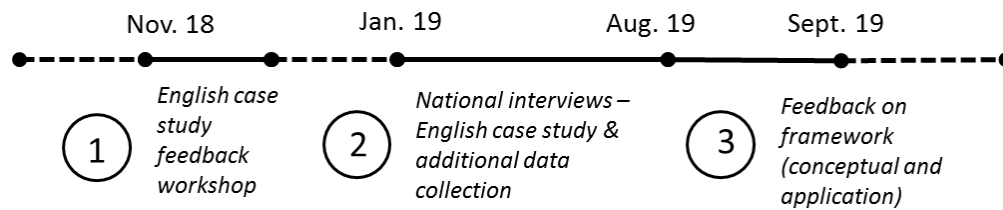


Figure 3-9 Timeline of verification phases during the research period

The first opportunity to gain feedback on the preliminary findings arose in November 2018 when the researcher requested to present at a Regional LLFA meeting. This was a meeting organised by Anglian Water, where all the LLFAs in the Anglian Region are joined together with representatives from the Environment Agency. Upon request, a space was provided to briefly present the research and gain interactive feedback on initial results during the lunch break and after the workshop through an interactive poster display. Considering the short time given to gain feedback, emphasis was placed on the relationship strength and influencing mechanisms elements of the framework. This was done using large posters as shown in Figure 3-10. Participants were able to add comments using sticky notes, different coloured stickers to indicate if they agreed with the given relationships strength and could write any further information directly onto the poster. This was found to be a very useful exercise to reflect on the analysis and identify any inconsistencies. The figures developed for the workshop were then updated with the results and notes were written up, these figures are presented in Appendix H. Although this meeting was interactive with the researcher, it is also considered a participant observation meeting as the researcher observed during the main content of the meeting. The results were then used to inform the analysis for the application of the framework in Chapter 5.



Figure 3-10 Interactive feedback workshop

The second phase of the verification process included undertaking national level interviews between January and March 2019, as introduced in Section 3.2.1 (listed in Appendix A). Although these were used primarily to collect data, they represented an opportunity to gain clarity on the data collected at the local level. These interviews also offered a chance to get feedback on the key elements of the conceptual framework, which was presented in a 1-page document used during the interviews. Additionally, the results from the feedback workshop were used during the interviews where appropriate. The information collected was then used to support the analysis for the application of the framework for the English case study in Chapter 5.

The third phase of the verification process was completed between September and October 2019 at the last stage of the research. These interviews served multiple purposes, predominately aiming to gain feedback on the credibility of the framework application for the sectors most relevant to the interviewee and to gain insights into the applicability and usefulness of the framework. To do this in an efficient way, 1 to 3-page overview documents were prepared outlining the 1) overview of the framework, 2) results for the English and Serbian applications of the framework, 3) summary of Chapter 7 on the role of individuals and 4) an overview of the key recommendations on integration in FRM gained from the study. These were used as a simple way for interviewees to write directly on the documents and encourage discussion on specific results – see examples in Figure 3-11. During this phase interviews with six individuals were conducted, one of which was previously interviewed in the Leeds study area. The interviewees were selected based on their broader knowledge and ability to reflect on the specific results from the case study. One interviewee representing the RFCCs and LLFAs were selected from outside the study areas to gain a wider perspective on the results. As a result of this process, no changes were made to the framework, however, the results were used to inform and clarify the analysis of the data for the framework application in England and Serbia. The results were also used to reflect on the applicability of the framework and the recommendations from the study, as presented in Section 8.3 and 8.4.

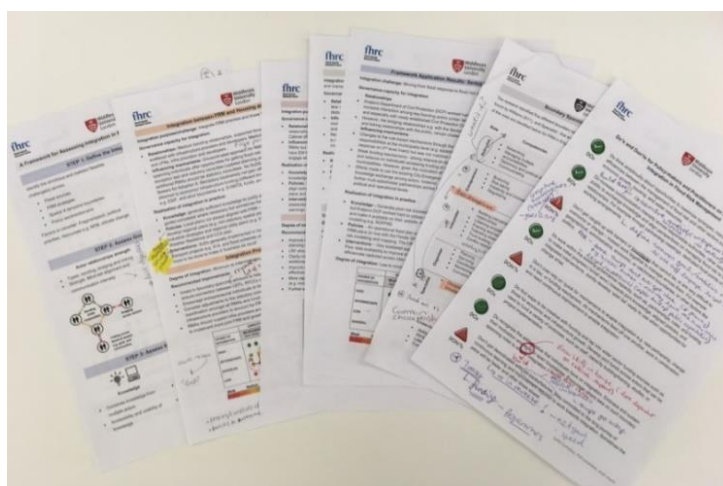


Figure 3-11 Example of the documents used to support the feedback interviews

Additionally, an interview was conducted with an international academic on risk governance to gain feedback on the conceptual framework. This was supplemented by feedback received during the peer-review process of the journal publication written about the assessment framework. The framework was adapted as a result of the peer-review process, for example, the wording of the key elements of integration in FRM. A full copy of the published article can be found in Appendix J. Furthermore, for the Serbia case study written feedback was provided on a draft chapter of the results and a feedback interview was held with a consultant at Deltares with extensive experience working in Serbia. These interviewees are listed in Appendix A and labelled as VD-01, VD-02 etc. Table 3-3 provides an overview of the different phases of the evaluation process and the methods used to gain different types of feedback.

Table 3-3 Overview of the research evaluation process

Type of feedback expected	Phase 1	Phase 2	Phase 3
Conceptual framework		National Interviews	Feedback Interviews Written feedback
Feedback on the framework application results	Workshop (English case study)	National Interviews	Feedback Interviews (England) Written feedback (Serbia)
Key recommendations/ guidance on integration			Feedback Interviews
Usability of the framework			Feedback Interviews

3.4.2 Researcher positionality

In qualitative research, in particular when taking a constructivist approach, the influence of the background and knowledge of the researcher and how this transforms the research process and the data analysis, needs to be recognised (Butler 2001). Furthermore, researchers can make different contributions to social knowledge in roles as ‘insiders’ or ‘outsiders’ (Merton 1972). Within this research, the researcher played both roles, which is common across qualitative research studies (Merton 1972).

For the English case study, the researcher acted as more of an ‘insider’. Firstly, the researcher has a strong educational, research and consultancy-based background on FRM covering both the civil engineering and social sciences aspects, thus could easily engage on the topic. Additionally, the researcher’s Irish nationality made it easy for them to engage with the participants, given the similarities in language, climate and culture. Furthermore, the researcher’s ability to play this role grew throughout the course of the research as their interactions with multiple actors increased and their knowledge grew. In this way, they were more effective at engaging, interpreting and processing the information presented during interviews, and thus more in-depth conversations were possible. Especially due to their presence in multiple meetings, the researcher started to recognise familiar faces at different events and gradually gained recognition and appreciation as an academic member of the FRM community in England. The researcher’s role as an insider was deemed appropriate for developing the framework.

Comparatively, for the Serbian case study the researcher lacked experience of Serbian language or culture, thus played the ‘outsider’ role. Furthermore, their prior knowledge on FRM specific to Serbia was limited and the length of the field work was time-limited. However, this was deemed a suitable role to play for the application of the framework, as this is a likely scenario for future applications of such a framework.

In addition, capacity building for the next generation on FRM is of wider interest to the researcher, whereby additional research was conducted in line with their voluntary work at the Water Youth Network (Cumiskey et al. 2019a, 2019b). This research drew parallels around interdisciplinary working and was particularly useful in interpreting the findings related to the role of boundary spanning individuals, as described in Chapter 7.

For both case studies other underlying factors, such as the long-term history of local and national politics, were difficult for the researcher to easily converse about and interpret given their limited knowledge and experience. In such cases, the information collected from the interviewees was taken at face value, reflecting on what the interviewees expressed as relevant for the present situation.

Within this research, the aim was for both the researcher and participant to benefit in some way from the research process. It is foreseen that the results of the PhD research will be shared with all participants at a minimum through email and where possible through presentations in relevant partnership meetings and/or meeting papers. This will be completed to ensure that the participants and the wider FRM community can duly benefit from the research.

3.4.3 Methodological limitations

The general public was not the target of this research, as it aimed to focus more specifically on the relationships between those who are professionally working on FRM. However, interviews were conducted with a volunteer from an active flood action group in England and with three Civil Protection Commissioners in Serbia, to gain more insight into how community volunteers interact with FRM professionals. Especially considering the density of actors and their roles in FRM, focusing on professionals in FRM was deemed suitable for the study. It is also important to point out that despite conducting interviews nationally, these were focused on verifying the local level results and gaining insights into the influence of the national level policies on local and regional FRM. In such a way, a national level application of the framework was outside the scope of the study. However, other studies could focus specifically on assessing integration for FRM at national and/or community level.

Another limitation was that some actors and their related meetings were difficult to access. For example, no interviews were conducted with housing developers at the local level despite attempts to get an invitation to attend the developers' forum in Cambridgeshire. However, some insights were gained into the views of developers through an interview with the Crown Estate at the national level.

3.5 Background to the case studies: England and Serbia

The following sections provide detailed information on the background of the selected case studies England and Serbia, which supports the applications of the framework in Chapters 5 and 6.

3.5.1 England

Flooding is ranked as the natural hazard with the highest impact and likelihood in England (Cabinet Office 2017). One in six residential and commercial properties are at risk from fluvial, coastal or surface water flooding in England (Environment Agency 2009). The characteristics of rivers and their catchments vary across the country, with large rivers existing in the lowlands (e.g. Thames) and smaller quick response rivers in urban and upland areas. Significant flood events have occurred in recent years, for example summer floods in 2007, flooding in Cumbria in 2009 and 2015/2016, Somerset Levels floods in 2014, Leeds Boxing Day floods in 2015, and most recently the South Yorkshire floods in 2019, all of which resulted in widespread damages to property and infrastructure. The winter of 2015/2016 was the second wettest winter on record and a series of storms (including Desmond and Eva) resulted £1.6 billion in economic damages (Cabinet Office 2017). Furthermore, flood risk is expected to rise in the future, as documented in the Long-Term Investment Scenarios study (Environment Agency 2019c).

Nationally significant events in England, such as those listed, brought attention to the need for investment in FRM and opportunities to change the direction of policy (Tunstall et al. 2004). The Environment Agency, under the Department for the Environment, Food and Rural Affairs (Defra) takes a strategic overview of the management of all sources of flooding and coastal change, while being the lead authority for managing the risk of flooding from main rivers, reservoirs, estuaries and the sea. Responsibilities for FRM in England for different sources of flooding were adapted after Pitt Review in 2010 (Pitt 2008) (prepared after the 2007 floods) which led to the Flood and Water Management Act (FWMA) (UK Government 2010). Through the FWMA (2010), the Risk Management Authorities (RMAs) were defined as (a) the Environment Agency, (b) a Lead Local Flood Authority (LLFA), (c) a district council for an area for which there is no unitary authority, (d) an Internal Drainage Board (IDB), (e) a water company, and (f) a highway authority. All RMAs have a duty to cooperate and share information. Figure 3-12 shows the distribution of responsibilities

across these RMAs for different sources of flood risk. Additionally, the role of Regional Flood and Coastal Committees (RFCC) plays an important role in approving the Environment Agency investment programme and collecting the local levy (joint funding mechanism across local authorities in the region) and deciding on how it is spent.

In England local authorities are either single-tier (unitary) i.e. all the council services operate at one level, or two-tier i.e. the services are split between two levels – a county council and district councils where the county is the responsible LLFA and Highways Authority, and the district councils are the responsible Planning Authorities. The Environment Agency have a national team and local teams defined by catchment areas, typically including a separate FRM and environment team. The FRM team is typically has an area flood risk manager and an operations manager responsible for ongoing maintenance of flood risk assets. The FRM team is split into a Programme and Strategic Overview (PSO) team, a programming team responsible for the 6-year capital investment programme, and the resilience team responsible for community engagement, flood warning and incident management.

Risk source	Environment Agency	Lead Local Flood Authority	District Councils	Water company	Highways Authority	Internal Drainage Board
Main river	✓					
Sea	✓					
Surface water		✓				✓
Surface Water (on or coming from the Highway)					✓	
Sewer Flooding				✓		
Ordinary Watercourse		✓	✓			✓
Groundwater		✓				
Reservoirs	✓*	✓*	✓*	✓*	✓*	✓*
Coastal Erosion	✓		✓			
Strategic overview of all sources of flood risk (and the coast)	✓					

*Please note RMAs have different responsibilities for reservoirs such as regulation, asset management and flood incident response.

Figure 3-12 Summary of responsibilities for Risk Management Authorities in England for different sources of risk (Environment Agency 2016b)

FRM in England is dependent on and influenced by other sectors, policy domains and their associated legislation. Emergency management in England brings together Category 1 (including the EA and local authorities) and Category 2 responders (cooperating bodies e.g. utility companies) to plan for emergencies and cooperate under the Civil Contingencies Act

2004 (Cabinet Office 2004) and collaborate through Local Resilience Forums (LRF). The EA alongside their role in FRM, are responsible for protecting the environment as required under the Water Framework Directive (WFD; 2000/60/EC) and established the Catchment Based Approach (CaBA) resulting in establishing catchment partnerships across England (CaBA 2017). The Local Planning Authorities, Combined Authorities, infrastructure providers (e.g. Network Rail, Highways England), and developers all influence the housing and infrastructure growth sector. The Local Enterprise Partnerships (LEPs) usually sitting within the Combined Authorities, are a top level of administration focusing on economic growth and development of a region, managing the money from national level e.g. the LEP Growth Fund.

In line with the requirements under the Floods Directive (transposed into UK law as the Flood Regulations 2009) and the FWMA 2010, multiple FRM plans and strategies from the national to local levels are produced. The National Flood and Coastal Erosion Risk Management (FCERM) Strategy is currently being updated for publication in 2020 (last published in 2011). The Regional Flood Risk Management Plans were prepared in 2015 (directed under the Flood Risk Regulations 2009) which surpassed the Catchment Flood Management Plans prepared by the Environment Agency in 2010 (Evans et al. 2002). The Local Flood Risk Management Strategies were prepared by LLFAs under the FWMA (2010) and some Surface Water Management Plans have been voluntarily prepared by LLFAs and/or water companies. In some areas Community Flood Plans are prepared by the community. Figure 3-13 presents an overview of these plans from the national to local level.

For emergency management each LRF region maintains a Severe Weather Plan and Multi-agency Flood Plan. In some cases new catchment based FRM plans have been developed e.g. Cumbria Flood Action plan emphasising a catchment based approach and partnership working in particular with communities (Environment Agency 2016c). Furthermore, from a sector specific planning perspective the 25 Year Environment Plan (HM Government 2018) strongly emphasises the importance of aligning environment and FRM objectives nationally and locally.

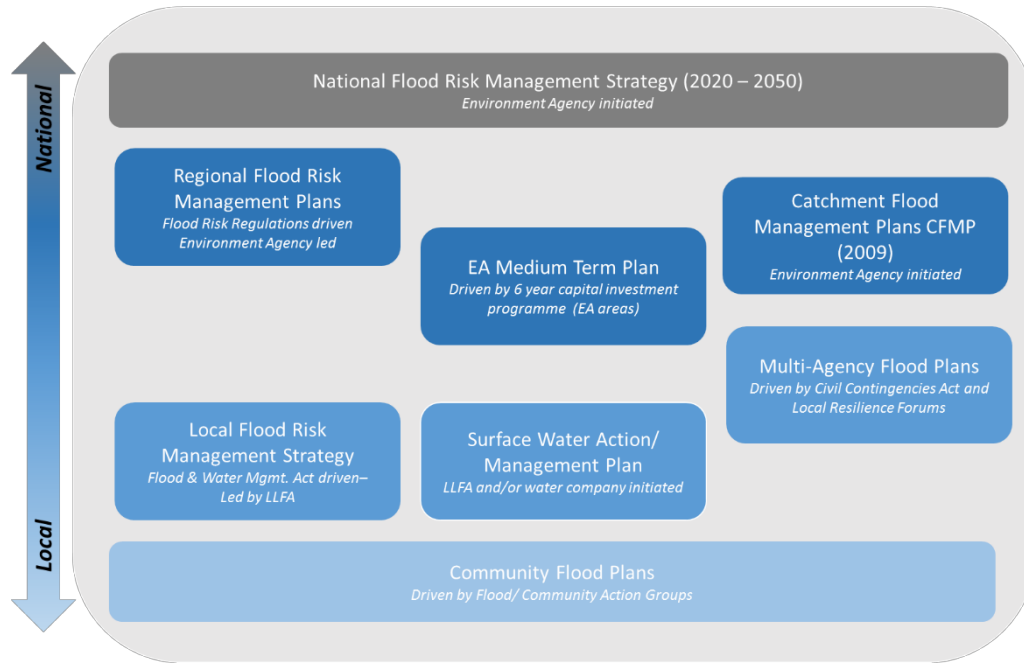


Figure 3-13 Overview of different FRM related plans in England

Between 2015 and 2021 the government committed to investing £2.6 billion into managing flooding and erosion to better protect 300,000 homes, through the EA 6-year capital investment programme. This programme is managed by the EA (medium-term plan) and approved by the RFCC year-on-year. In line with this, the government established a Partnership Funding approach which captured an additional £486 million from partners (Environment Agency 2019b), however, mainly from the public sector (Alexander et al. 2015). This investment has reportedly helped avoid economic damage to agricultural land and protection of transport infrastructure (Environment Agency 2019b). A strong emphasis is also placed on maintaining existing FRM infrastructure, through spending £200 million in 2018 and 2019 by the EA. However, the flood risk still remains high, as the EA estimates that at least £1 billion annual average investment is needed for flooding and coastal change infrastructure over the next 50 years (Environment Agency 2019b).

FRM in England has evolved from being heavily dependent on traditional concrete-based flood schemes to a recognition that a diverse range of interventions is needed to manage risk at a catchment scale (Johnson et al. 2005, Alexander et al. 2016). Combinations of FRM interventions have been consistently applied, but have arguably diversified in recent years; such as encouraging the uptake of property-level measures and working with natural processes as a core part of FRM (Environment Agency 2017, 2019b). Flood risk information is publicly available and the strength of the flood forecasting and warning system has been

recognised (Alexander et al. 2016). Overall, this background information presented on FRM in England helps to support the application of the framework in Chapter 5.

3.5.2 Serbia

Serbia is highly exposed and vulnerable to multiple natural hazards, most frequently, flooding and landslides, but also earthquakes and forest fires. In 2014 Serbia experienced its most severe flooding in 120 years, affecting more than 1.6 million people (22 percent of the population) (Government of the Republic of Serbia 2016) and damages of € 1.7 billion in the 38 affected municipalities (UNDP 2016). The flood event had devastating impacts on employment rates and livelihoods especially amongst vulnerable groups and rural populations – forcing people into poverty and pushing the country into recession (UNDP 2016). The municipality of Kraljevo, the largest in Serbia and situated in the West Morava and Ibar river catchments, was badly affected by the 2014 floods. Damages were estimated at €3 million, including 300 houses severely damaged, 1000 people evacuated, and 4300 hectares of agricultural land flooded (UNDP 2016). Kraljevo was flooded again in 2016 by flash floods resulting from heavy rainfall triggering landslides and erosion in almost all of the local communities and municipal roads, leaving approximately 200 homes damaged and evacuated, and approximately 2,000 hectares of arable land impacted (UNDP 2016).

Serbia is a country that recently suffered war (1992 -1995) resulting in huge damage to the economy (Bartlett 2009). As a candidate country for membership in EU, Serbia made significant changes to its policy and legal frameworks prior to 2014, mainly to harmonise them with EU standards, as outlined in Figure 3-14. Starting in December 2009, the Law on Emergency Situations (LES) was established, which included the recognition of Sector for Emergency Management (SEM) as a single body within the Ministry of Interior (MOI) where all emergency services from MOI, Ministry of Defence and Ministry of Environment were merged (Baras n.d.). Furthermore, there was a strong emphasis on the role of local government in Civil Protection and thus led to the establishment of municipal Departments of Civil Protection (DCP). The law was further updated in 2011 and 2012 whereby the municipalities are responsible to prepare Emergency Response Plans, local risk assessments, and establish and train civil protection units (volunteers) and other staff for managing response and recovery efforts locally. In April 2015 Serbia signed the agreement to participate in the EU Civil Protection Mechanism, which also presupposes harmonisation of the national legal framework with the EU one. Unfortunately, however in 2011 it was

already clear that the Law on Emergency Situations would struggle to be implemented at the local level “*as there is a clear lack of technically trained staff and funding.*” (Hachim et al. 2011 p. 8). Overall, the LES attempts to embed elements of preparedness especially in the later revisions, in comparison to their previous military style Civil Protection regime focusing heavily on ‘command and control’ response. This change was driven by Serbia’s commitment to implement the global policy – Hyogo Framework for Action (2010 – 2015) – and as a result, the National Strategy for Disaster Risk Reduction (DRR) and Protection and Rescue was established in 2011. The Strategy called for an Action Plan but unfortunately was never developed. However, in 2013 the National Platform on DRR was established as required under the Hyogo Framework. This was embedded with the existing National Emergency Management Headquarters which was established under the LES. Local platforms for DRR were not established at the municipal levels, however, City/Local Emergency Headquarters were put in place.

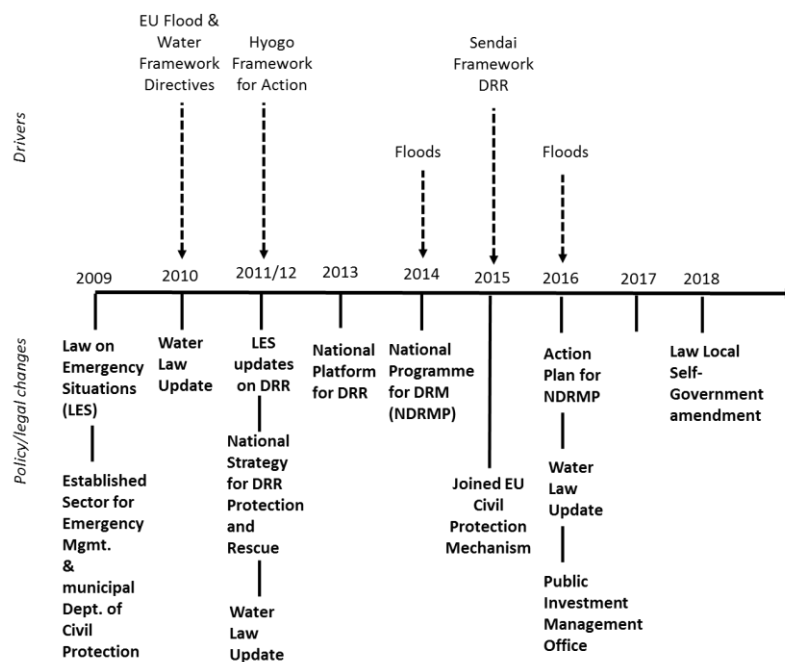


Figure 3-14 Timeline of policy and legal changes in Serbia and the external drivers

Further significant policy changes identified are the updates to the Water Law in 2010 (first created in 1991) to reflect the requirements from the EU Floods Directive and Water Framework Directive (updated again in 2012 and 2016). The crucial change is that the Public Water Management Companies (PWMC) (including Serbia Water) are no longer responsible for the management of 2nd level rivers, which instead was passed on to local

municipalities. The PWMCs retain responsibility for main rivers including; flood risk assessments and maps, flood management plans for river basin districts and funding the implementation of measures. Whereas, the municipalities are responsible for planning and funding any measures on 2nd level rivers. A positive step to help municipalities achieve this, is a more recent amendment to the Law on Local Self Government allowing inter-municipal cooperation and resource sharing – especially important for 2nd level rivers that cut through administrative boundaries. However, similarly to the LES, the municipalities face significant challenges to meet these obligations given their limited financial resources and technical knowledge (Ristić et al. 2012, Government of Serbia 2014).

Given the changes to the laws there are now multiple actors responsible for implementing interventions across the prevention, reduction and management of residual flood risk – at the local level in Serbia, as shown in Figure 3-15 (left). Responsibilities for preventing risk are held by the municipal planning departments for housing and the public firm in charge of urban infrastructure (herein called Urban Landscaping Public Firm). As explained Serbia Water (one of the three PWMCs) is responsible for flood protection infrastructure for main rivers (1st level) and the municipality (through the DCP and Urban Landscaping Public Firm) is responsible for 2nd level rivers. Residual risk is managed by the SEM and the DCP with support from Civil Protection Commissions, NGOs and Red Cross, and is dependent on information from the Republic Hydro-meteorological Service of Serbia (RMHSS).

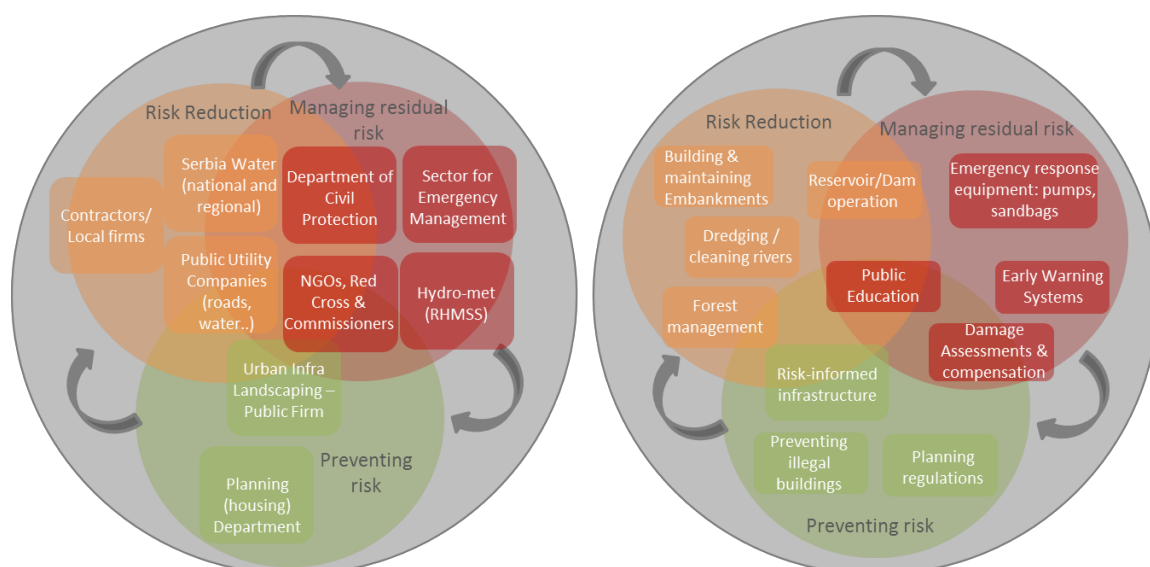


Figure 3-15 Key actors' responsibilities (left) and types of interventions (right) for Kraljevo Serbia

Post-war development investments were quickly undone due to the disaster impacts sending the state of the economy and its management of flood risk backwards. The weaknesses of the Disaster Risk Management (DRM) system in Serbia were exposed and the need to make more risk-informed investments going forward (Government of Serbia 2014). Speaking at the Global Platform on DRR in 2017 Marko Blagojevic in his speech highlighted *“how a single disaster can render meaningless considerable investments into development, we are now fully committed to making sure that the disaster risk management stays at the top of our development agenda for the years to come”* (Blagojevic 2017). Despite the progress on including the concepts of prevention, risk reduction and preparedness in policy and legal frameworks, from an operational perspective Serbia remains focused on emergency response with little success implementing DRR or FRM (Ristić et al. 2012, Government of Serbia 2014). The current state of flood protection interventions in Serbia has insufficient number and length of defences, with poor implementation of other risk reduction measures (e.g. dams, diversion channels), low standards of protection and lack of funds for maintenance (Janjic et al. 2015). Moving forward, there is recognition that a more diversified approach for interventions is required including improving EWS at all levels, developing risk zones that can be used for planning regulations, and building public awareness (Janjic et al. 2015), such as those listed in Figure 3-15 (right).

The National Disaster Risk Management (DRM) programme and Action Plan aim to bridge this implementation gap by unlocking international resources and building capacity of all institutions. Months after the 2014 disaster, through the support of international donors including; the EU, United Nations Development Programme (UNDP), World Bank, and Swiss Government, a significant change in policy direction from disaster response to DRM was made by launching the DRM Programme in 2014. This was established to support the Government of Serbia to elevate the DRM agenda by building a comprehensive DRM programme, channel funds and support implementation. The programme includes a strong focus on developing risk knowledge, implementing risk prevention and risk reduction interventions across sector and a range of preparedness, response and recovery related interventions. The DRM Programme is implemented through an Action Plan (2016 -2020) which is coordinated by the Public Investment Management Office (PIMO) (newly established in 2016). The Action Plan secured from the budget of the Republic of Serbia €320,000, and €62.4 million from international development assistance but requires a further €1 billion for full implementation (Government of the Republic of Serbia 2016).

The programme was strongly influenced by Serbia's commitment to the Sendai Framework on Disaster Risk Reduction (2015 – 2030) and is in line with its principles, while it aims to support Serbia's journey to comply with EU regulations. Therefore, overall there is strong momentum and commitment building to implement the policies and legal changes in Serbia, as summarised in Figure 3-14, especially given the pressures from the EU and international DRR and donor community. Overall, this background information presented on FRM in Serbia helps to support the application of the framework in Chapter 6.

3.6 Summary

This chapter outlined the qualitative methodological approach taken in this research to develop and apply a framework for assessing integration in FRM. It explained the data collection methods, participant selection, case study selection and background and the data analysis and evaluation processes. The next chapter describes in detail the resulting framework.

Chapter 4 A framework for assessing integration in flood risk management

This chapter presents the framework for assessing integration in FRM developed within this study. It builds on the selection of the key elements of integration put forward in the literature review in Chapter 2 by analysing the primary data as described in Chapter 3. The evidence collected on FRM in England (see Section 3.2) is used to present the framework herein. The chapter demonstrates the relevance of the selection of the elements and further details their associated indicators of relative strength and weakness. Furthermore, an approach is developed to visualise the strength of each of the elements to identify an integration profile. The framework presented in this chapter has been published as a peer-reviewed article (Cumiskey et al. 2019c), see in full in Appendix J. However, further details of the assessment approach are presented within this chapter compared to the publication. This chapter answers research question one: *What are the different elements of integration and how can they be assessed to understand the complexity of integration in FRM?*

4.1 Assessment framework and integration profiles

As introduced in Chapter 2, the assessment framework developed within this study specifies the key elements of integration in FRM as follows, whereby the first two elements represent the governance capacity for integration and the latter three elements represent the realisation of integration in practice:

- Actor relationships – split into bridging, bonding and linking relationships;
- Influencing mechanisms – split into actor-, rule- and resource-based mechanisms;
- Knowledge;
- Policies– split into FRM and sector-specific plans;
- Interventions – split between FRM and sector-specific interventions.

Each of these elements (or components thereof) is assessed individually on a five point scale from strong (green) to weak (red) using indicators to identify their contribution to integration in FRM, as presented in Figure 4-1. By mapping the strength of each of the elements, a profile of integration emerges, as shown by the black line in Figure 4-1. The reasoning behind developing this visualisation of the integration profile is to guide the identification of the critical elements for improvement, and to help recognise the patterns or dependencies between elements of both the governance capacity and realisation of integration in FRM.

The framework presented in this chapter uses the data on FRM in England to demonstrate the relevance and appropriateness of the key elements of integration and the associated indicators. The chapter focuses on the use of the data collected from actors who have a wider remit or experience on FRM outside the study areas (Leeds and Cambridgeshire) to demonstrate the broad applicability of the key elements and indicators in the framework and to avoid repetition with later chapters. Furthermore, it is important to acknowledge that the framework was developed based on a broader set of data from the English case study (including Leeds and Cambridgeshire) and was updated based on the data collected from the Serbian case study – as explained in Section 3.2. The more detailed findings on the performance of each of the elements and associated indicators are instead presented in Chapter 5 for England and 6 for Serbia. This also allows for a more concise presentation of the framework in this chapter.

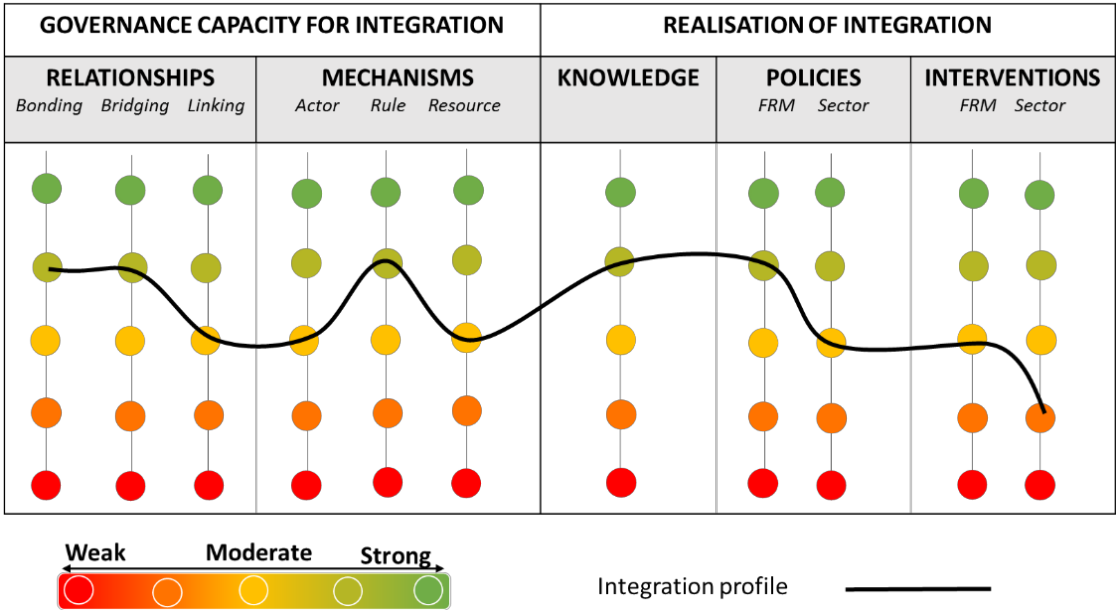


Figure 4-1 Visualising the strength of the key elements and the resulting integration profile

The following sections within this chapter explain how the indicators were selected and can be used to assess each element. The assessment framework is presented in the form of tables, which identify the indicators for each element (or in some cases for each component) and how they can be assessed using a qualitative description of the meaning for high, moderate, and low strength of each element, as shown in Figure 4-1.

Figure 4-1 already provides some indication of the degree of integration i.e. combinations of the strength of different elements. However, the analysis from the applications of the framework enables a more nuanced and refined description of each of the degrees of integration, which is described in depth in Section 8.2. The emerging patterns across the integration profiles helped to formulate insights into the relative combinations of strength across the elements to characterise different degrees of integration in FRM.

4.2 Identifying the integration challenge

The first step in assessing integration is to identify the integration challenge being addressed for FRM. As presented in literature in Section 2.5.1, there are multiple ways of approaching the integration challenge in FRM because of its associated complexity. As explained in the description of the case studies (see Section 3.5), there is a wide range of policy sectors and associated actors across public and private sectors that influence FRM in England. Additionally, there are multiple sources of flood risk and FRM strategies in place. Therefore, there is a strong need for integration across many of the challenges presented in Figure 2-8 in Chapter 2 – sources of flood risk, FRM strategies, temporal scales, spatial boundaries and policy domains/sectors. Through the data analysis for FRM the significance of four integration challenges for FRM emerged in England.

The first integration challenge demonstrated the need for key FRM actors to work jointly across all sources of flood risk. This is particularly challenging for FRM in England because Risk Management Authorities (RMAs) need to integrate knowledge, policies and interventions across different sources of flood risk, in particular main river (EA- led), ordinary water courses (LLFA and/or IDBs led), sewer flooding (water company led) and highway drainage (highway authority led). The need to integrate across all sources of flood risk was found to be strongly accepted by all RMAs, who recognised the potential for capturing synergies and efficiencies across FRM interventions for multiple sources of flood risk.

Secondly, the importance of cross-sectoral integration challenges emerged strongly from the data considering the complex array of policy domains and sectors in England that interact with FRM. Through the process of conducting and analysing the interviews, three key cross-sectoral integration challenges emerged as having strong integration potential with FRM, 1) emergency management (red), 2) environment, agriculture and land management (green), and 3) housing and infrastructure growth (orange), as shown in Figure 4-2. The sectors were selected because they were dominant in the data collected in England, demonstrated clear benefits for integration with the FRM sector and were recognised as being driven by different priorities. For example, priority for integration with the environment, land and agriculture sector and FRM is enhanced considering the regulatory alignment between the Water Framework Directive and the Floods Directive. Furthermore, flood events and the associated damages experienced across sectors (e.g. Cumbria 2009/2015) led to recognition from national actors that FRM requires a catchment-based approach, and thus discourses around Natural Flood Management (NFM) and Working with Natural Processes became more common (Environment Agency 2019d). For other sectors, such as housing, growth and infrastructure, the benefits of integrating with FRM are high for the FRM sector (e.g. reducing building on floodplains), however, the private sector interests and priorities are difficult for the FRM sector to influence. The Chair of the EA captured this need to reframe FRM to enable integration across multiple sectors during the FCERM stakeholder forum (PO-8) indicating that it is *“important to join up as many dots as possible and frame [FRM] in a way for those that don’t see it as a priority.”* These three sectors, as shown in Figure 4-2, form the integration challenges whereby the framework is applied in Chapter 5 using the data collected from the study areas in England. By assessing integration across these different sectors with varied interests in FRM, more insights can be gained into the barriers and enablers for achieving integration in FRM.

Nevertheless, it is recognised that these three sectors selected for analysis are a simplification of the existing policy domains. For example, water resources are not specifically included although they do overlap with multiple sectors identified and health is not specifically addressed. Furthermore, it is acknowledged that the external sectors will overlap with each other e.g. environment and planning, but for the focus of this research these are not covered.

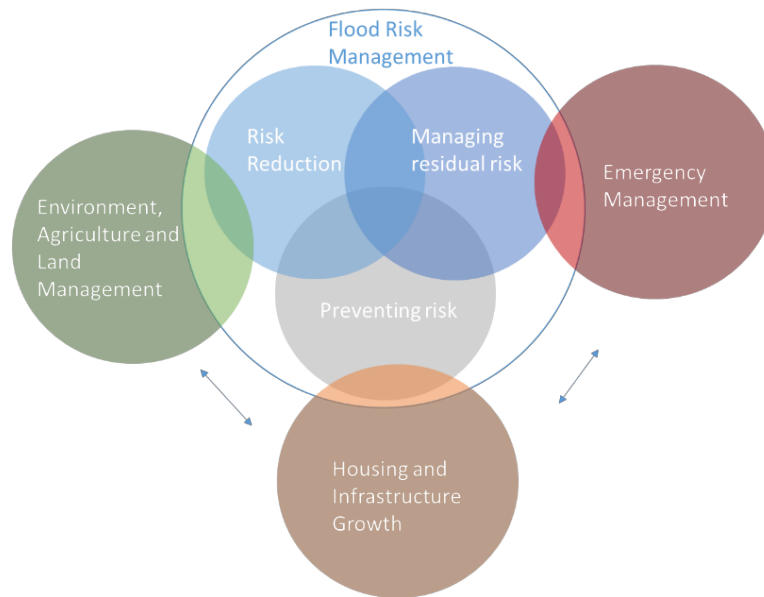


Figure 4-2 FRM and sector-specific integration challenges

In addition, the framework could be applied in a way that delves further into other integration challenges (as outlined in Section 2.5.1) for FRM in England. For example, an organisation may have separate teams working on incident response, operational management and strategic planning (e.g. EA, water companies and Local Authorities), and these thus would benefit from assessing the degree of integration across them. Furthermore, considering the diverse range of FRM strategies in place in England there is a need to integrate with and across them over the short-term (incident response), medium-term (operational) and long-term (strategic planning). These different temporal scales were found to have more influence on integration between different sectors, e.g. emergency management, and links with the incident management and operational arms of other organisations and RMAs. In comparison, the strategic timescale links more with sectors like housing and infrastructure growth. In such a way, multiple integration challenges can be addressed for FRM.

Overall, this section demonstrated that the selection of the integration challenge in the context of FRM is the first important step to assess integration and utilise the framework presented herein. Understanding the possible integration challenges helps to break down the sometimes-overwhelming task of realising integration in practice for FRM.

4.3 Assessing the governance capacity for integration in flood risk management

As identified in Section 2.2, the governance capacity for integration is composed of the strength of the actor relationships, here identified as bridging, bonding and linking, and their influencing mechanisms, here identified as actor-, rule- and resource-based mechanisms. This section presents the indicators identified for each of the key elements and demonstrates how these emerged from the data and where applicable supported by literature. Furthermore, the appropriateness of these categorisations is demonstrated, and evidence is provided to assess the high, moderate and low strength of the elements.

4.3.1 Actor relationships

Considering the wide range of actors that currently play a role in FRM, or have the ability to do so, breaking relationships down into bonding, bridging and linking relationships can help to distinguish them. These concepts were used by Gitell and Vidal (1998) and Szreter and Wollock (2004) for identifying social capital, as introduced in Section 2.2.1. Figure 4-3 emphasises the bonding, bridging and linking relationships between actors in connection with each of the cross-sectoral integration challenges identified for the English case study (Figure 4-2).

Those actors which have a stronger interest and formal role/responsibilities for FRM i.e. the RMAs are identified as bonding relationships (blue inner circle) (Figure 4-3). Bridging relationships are those identified between FRM and specific sectors, as shown for emergency management (red), environment agriculture and land management (green), and housing and infrastructure growth (orange) (Figure 4-3). The linking relationships are those in the outer circles representing actors at different spatial levels and power, e.g. communities with local government, or national and local government organisations. Overall, this categorisation was found to be useful for recognising the relationships that improved or deteriorated over time, which is further explained in Chapter 5. Next, the indicators selected to represent the strength of the relationships are discussed.

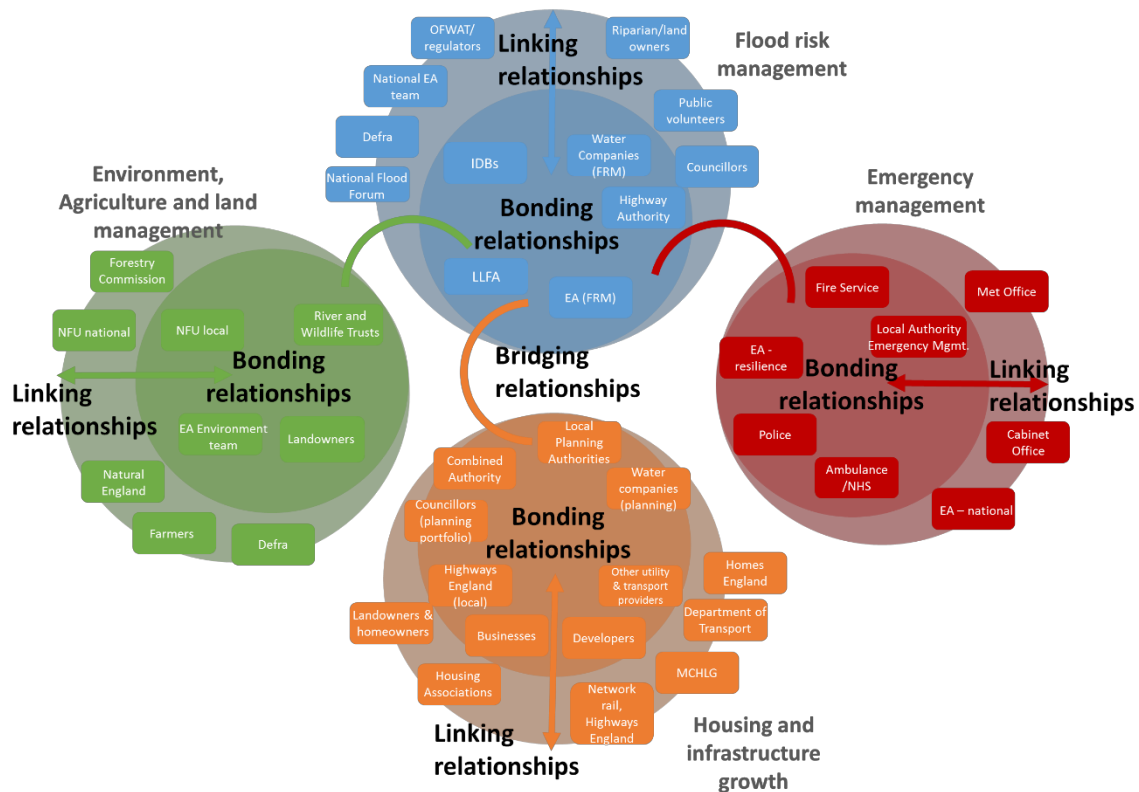


Figure 4-3 Overview of actors across sectors and types of relationships (bonding, bridging and linking)

The following indicators emerged from the data and were supported by the literature:

- Mind-set alignment – including the organisational culture, willingness to collaborate and knowledge/awareness of interdependencies/benefits;
- Communication intensity – including the direction and frequency.

Table 4-1 uses these indicators to generate a simplified meaning for a strong, moderate and weak relationship between actors that can be used in the assessment of bonding, bridging and linking relationships using the visual aid in Figure 4-1. These can be used to easily distinguish the strength of a specific relationship, or to more generally assess the strength of multiple bonding, bridging and linking relationships. In cases where the assessment of the indicator is between strong and moderate strength, this can be presented in light green and if moderate to weak it can be presented as orange in Figure 4-1. This could be the case if some of the indicators are applicable for both categories. The following paragraphs provide evidence on the selection of each of these indicators from the literature and demonstrate their relevance for FRM using the data collected on FRM in England.

Table 4-1 Strength of bridging, bonding and linking relationships in enabling integration

Strong	Moderate	Weak
<ul style="list-style-type: none"> Aligned mind-set between most bonding, bridging or linking actors - proactive organisational culture, willingness to work together and ability to overcome challenges, and high knowledge on dependencies/benefits. High communication intensity between most bonding, bridging or linking actors - two-way, high frequency (e.g. regular attendance at meetings, easy bilateral exchange). 	<ul style="list-style-type: none"> Partially aligned mind-set between bonding, bridging or linking actors- proactive (individuals) within organisations, open attitude and willingness to work together but challenged by rules/mandates and focus on own interests as moderate knowledge on dependencies/benefits. Moderate communication intensity between some bonding, bridging or linking actors – mix of one-way and two-way, varied frequency (e.g. some attendance at meetings, varied bilateral exchange). 	<ul style="list-style-type: none"> Different mind-set between most bonding, bridging or linking actors - siloed organisational culture, closed attitude to joint working ('someone else's problem') and low knowledge on dependencies and potential benefits. Low communication intensity between most bonding, bridging or linking actors - one-way, low frequency (e.g. not invited to meetings, ineffective bilateral exchange).

Mind-set alignment: The first indicator identified as influencing the strength of the relationships between actors is their common, aligned or shared mind-sets and perspectives on FRM (Underdal 1980, Keast et al. 2007, McNamara 2012, Emerson et al. 2012, Candel and Biesbroek 2016). This indicator was initially identified in the literature and its relevance for FRM was demonstrated through the evidence collected because of the variety of actors working on FRM across sectors and sources of flood risk in England. For the bonding relationships it was clearly evident that FRM actor mind-sets had aligned significantly since the implementation of the FWMA (2010), supported by a changing culture within the EA on working in partnership, as expressed by multiple interviewees. This led to the creation of a sense of a 'flood family', a term found to be used often during the National FCERM stakeholder forum and other events. The former culture of working included a lot of 'finger pointing' among RMAs, as demonstrated in the following quote (N-01). In comparison, the current openness and willingness to support each other was clearly evident, especially amongst RMAs, demonstrated by an LLFA representative (VE-01).

Historically everyone used to just point the finger at each other, and everyone used to just blame each other and now they can't do that because we built too good a partnership to do that. You work together to deal with the issues. (ADEPT representative N-01)

I know it's a problem for you, I'll come and help you out, I know you'll do the same for me next time around. Being willing to lose an afternoon and sit in a meeting and talk about what issues they have on the basis that you know that it gets you a bit of goodwill in return. (LLFA representative VE-01)

Such influences of culture and willingness to collaborate are widely supported across the literature (Williams and Sullivan 2009, Barquet et al. 2016), however, the evidence presented here demonstrates the relevance for achieving integration in FRM. Many actors will be driven by other priorities, such as agriculture, water supply or infrastructure, and are constrained by their mandates and resources, which influences the strength of bridging relationships (Ran and Nedovic-Budic 2016, Vallejo and Mullan 2017). However, it was found that these constraints should not influence their ability to recognise the importance of managing flood risk and their openness and willingness to engage with the problem jointly. An example of this is within the water companies which also had a shift in attitude away from *“it’s not our problem, it’s someone else’s problem”* to working in partnership with other RMAs to solve surface water issues (N-09). This willingness to engage with partners is demonstrated through their interest in committing to partnerships, for example the Northumbria Integrated Drainage Partnership, hosted by Northumbria Water, improved relationships across partners, as shown in the following quote;

The Northumbria Integrated Drainage Partnership pushes the boundaries of what they are able to do. They are able to do that because they have actors that are willing to play the game and play with each other. (RFCC representative VE-05)

The actors’ level of knowledge about the problem, their specific interdependencies and their awareness of the benefits of working together was found to influence this change in mind-set, as evident across the literature (Tippett et al. 2005, Mostert et al. 2008). For example, for infrastructure providers, such as Network Rail, the journey towards a more collaborative mind-set with FRM actors was found dependant on increasing the knowledge of staff/employees of the potential benefits (N-06). In such a way, the level of interest was found to be dependent on having staff that understand the value of working together and were willing to drive it locally (N-06; N-14a). The role of individuals is discussed further in Section 4.3.2 and in Chapter 7.

Communication intensity: The next indicator identified in both the literature (relating to FRM and collaboration) and across the data collected, which influences the strength of the actor relationships is the level of intensity of the communication between actors (Vangen and Huxham 2003, Keast et al. 2007, Stead 2008, Gilissen et al. 2015). The relevance of this indicator for achieving integration in FRM was demonstrated in the evidence collected in England. Communication between actors on FRM varied from being frequent, infrequent, one-way focused on disseminating information or a two-way discussion. As also recognised

in the literature the communication intensity was found to be influenced by the availability of, and actors' engagement with, actor-based mechanisms. For example, their attendance at partnership meetings, the availability and accessibility of staff for bilateral exchange, and the use of ICT tools, e.g. email, websites, newsletters (further discussed in Section 4.3.2). Evidence of intense communication between some actors was observed throughout the FCERM stakeholder meetings and partnership meetings, where familiar faces were attending and there was a clear distinction between the actors that knew each other (thus were more comfortable with one another, engaging in discussion and talking about their next interactions) and those who were more of an outsider to the FRM, so called, 'flood family'. An example of this is the rare attendance of the Ministry of Housing and Local Government (MHCLG) at the national FCERM stakeholder forum. These 'newcomers' were observed as being more passively engaged, however, still very much welcomed by the core FRM attendees when present. Furthermore, throughout the majority of interviews the importance of maintaining conversations among the actors was identified as critical for building trustworthy relationships to support integration in FRM. For example, in the following quote, one actor refers to how frustrating communication used to be with actors;

You couldn't get them [water company] on the phone until about a year ago, couldn't talk to anybody ... Oh my god, they are unrecognisable from what they were 5 years ago. (Nene valley catchment partnership host CB-16)

Further details on the mechanisms that were found to influence the strength of the relationships between actors are discussed in the next section.

4.3.2 Influencing mechanisms

The strength of the relationships was found to be highly connected to the presence and quality (or strength, to be consistent for the proposed visualisation in Figure 4-1) of the influencing mechanisms. As introduced in Section 2.2.2 literature review, three types of mechanisms are identified as actor-, rule- and resource-based (building on the PAA approach (Arts et al. 2006)). A variety of these mechanisms were identified and discussed in the interviews with FRM and sector-specific actors to determine their relevance for FRM integration, and in some cases observed in operation. These mechanisms are listed in Table 4-3, Table 4-4 and Table 4-5, embedded within their respective sub-sections. These examples are deemed important for demonstrating the applicability of the approach selected to categorise the actor-, rule-, and resource-based mechanisms.

A variety of factors was identified during the interviews that influenced the positive or negative effect the mechanisms had on integration in FRM. Those interviewed discussed the importance of maximising the use of both FRM and sector-specific mechanisms, both locally, regionally and nationally. Here indicators are selected to identify the strength of the actor-, rule-, and resource-based mechanisms from strong to weak, as shown in Table 4-2. These can be used as an aid to easily distinguish the strength of a specific mechanism, or to more generally assess the overall strength of the actor-, rule-, and resource-based mechanisms available. The following paragraphs provide more details on the selection of each of these indicators where appropriate from the literature and demonstrate their relevance for FRM using the data collected on FRM in England.

Table 4-2 Strength of actor-, rule- and resource-based mechanisms in enabling integration

	Strong (mostly positive)	Moderate (mix pos. /neg.)	Weak (mostly negative)
Actor-based	<ul style="list-style-type: none"> • High diversity and continuity of actors engaged (across sectoral and spatial boundaries) through partnerships • Benefits of joint working strongly outweigh transaction costs • Sufficiently resourced proactive staff 	<ul style="list-style-type: none"> • Some diversity and continuity actors engaged (across sectoral and spatial boundaries) through partnerships • Benefits of joint working generally outweigh transaction costs • Some proactive staff but poorly resourced 	<ul style="list-style-type: none"> • Few partnerships (or similar) exist (with limited members) • Transaction costs of joint working strongly outweigh benefits (or perceived to) • Limited or very poorly resourced staff
Rule-based	<ul style="list-style-type: none"> • Clear roles and responsibilities with supported resources • Effective cooperation agreements/ contracts in place that can be used by multiple actors • Sufficient fit-for-purpose tests/ regulations in place and enforced 	<ul style="list-style-type: none"> • Some roles and responsibility require clarification • Some cooperation agreements/ contracts in place but not fully effective • Some tests/regulations in place but some poorly enforced/ designed 	<ul style="list-style-type: none"> • Unclear roles and responsibilities • No means to establish cooperation agreements/ contracts • Insufficient tests/regulations in place and if so, poorly designed
Resource-based	<ul style="list-style-type: none"> • Strong variety of joint funding sources available and functioning • Flexible (FRM/wider) funding with no or less 'strings' • Workable timescales/ continuity of funding sources 	<ul style="list-style-type: none"> • Some joint funding sources available with some constraints • FRM/wider funding accessible but with a lot of 'strings' • Challenging timescales/ continuity of (some) funding sources 	<ul style="list-style-type: none"> • Poor variety of funding mechanisms available (no joint funds) • Inaccessible (wider) funding sources • Short timescales of funding sources

4.3.2.1 Actor-based mechanisms

The following indicators have been identified to assess the strength of actor-based mechanisms, a list of examples of these for FRM in England are shown in Table 4-3:

- Diversity and continuity of actors engaged;
- Benefits versus transaction costs of engagement;
- Availability of proactive and resourced staff.

Diversity and continuity of actors engaged (in partnerships/decision making): The evidence collected on FRM in England demonstrated the importance of having diversity and continuity of the members backgrounds and sectors represented on partnerships or forums to build actor relationships and subsequently enable integration in FRM. Similarly, this indicator was recognised in literature on collaboration (Huxham and Vangen 2000a, Emerson et al. 2012). For example, the RFCC structure is statutory and highly formalised in comparison to the local FRM partnerships and catchment partnerships which are based on voluntary participation. The formality helps to ensure participation, however, having fewer rigid rules about membership would enable more flexibility and the ability to adapt the structure and process as the need arises. Engagement of community members or representatives is not yet standard practice for RFCCs (Benson et al. 2016, Mehring et al. 2018), however, it was identified that some have done so e.g. Northwest RFCC (N-15) (further discussed in Section 5.1.1). Furthermore, the inconsistent representation of IDBs on the RFCC is something which the Association of Drainage Authorities (ADA) tries to improve.

We are pushing quite hard to get IDBs on as EA members for RFCC. There is not enough mix of appointed members on RFCC ... There is still more work to do. That is one of our roles to make sure that when vacancies come up, to get our members involved in the RFCC. (ADA representative N-02)

The continuity and diversity of members or organisations engaged was found to help increase the communication intensity and build personal relationships.

Benefits versus transaction costs of engagement: As recognised in both the literature and the data collected on FRM in England, the time commitment to working in partnership (e.g. hiring individuals or coordinating partnerships) can incur significant transaction costs (e.g. time lost on working on projects, travel costs, time on follow up tasks, knock-ons) for organisations which need to be justified through results (Huxham 2003, Ridder et al. 2005,

Hegger et al. 2014). There is significant time commitment required for partners to engage across multiple partnerships, especially if the spatial boundaries do not align (e.g. geographical or administrative) and multiple meetings need to be attended. There was a sense that having meetings that turn into ‘talking shops’ was not welcomed and instead members wanted to see beneficial results from their engagement. The benefits identified were in the form of wider knowledge gained outside of one’s discipline/sector (e.g. emergency management, community engagement), time savings because they could quickly resolve issues/problems, being able to provide specific input to plans or identification and monitoring of joint studies and projects on FRM. For example, at the RFCC decisions are made about how to spend their joint funding mechanism (local levy), thus concrete outcomes are expected, incentivising actors to stay involved. Additionally, the local FRM partnerships were found to act as a stable space for multi-actor engagement in the development and review of the Local Flood Risk Management Strategies led by LLFAs (N-15), as similarly noted by Benson et al. (2018). Vangen and Huxham (2003) term such beneficial outputs of partnership working as ‘collaborative advantage’.

Availability of proactive and resourced staff: The next indicator identified to influence the strength of actor-based mechanisms is the availability of proactive and resourced staff, as found across the literature (Williams 2002, 2011, Taylor 2009) and within the evidence on FRM in England. Such staff were found to support knowledge exchange and communication amongst actors to enable integration in FRM. For example, the change in the relationship between the EA and IDBs was partially due to strong leadership from individuals, as illustrated by the following quote.

For the EA, I have to say it comes back to people, a handful of people that said, ‘right this needs to change’. How are we going to change it? How are we going to win around the easier drainage boards? Once they had clocked where this was going, they were able to talk to their colleagues and peers and say, ‘look let’s forget the hostilities and start thinking about working together’. (ADA representative N-02)

Additionally, after the implementation of the FWMA (2010) some water companies employed staff to liaise with the EA and LLFAs which worked well to improve communication and sharing of information between partners (N-11). This indicates that dedicating time for staff to spend on working in partnership is worthwhile for strengthening relationships and thus enabling integration in FRM. Chapter 7 goes into more depth on the influence of ‘boundary spanning’ individuals on integration in FRM drawing on theory surrounding ‘structure-agency interplay’ (Giddens 1984, Hay 1995, Williams 2011).

Table 4-3 Examples of actor-based mechanisms identified for FRM in England

Mechanisms	Examples
Committees/ Panels (statutory/ non-voluntary)	<ul style="list-style-type: none"> Regional Flood and Coastal Committees (and working groups) Local resilience forums (and working groups) River Basin Liaison Panels (under the WFD) Local government scrutiny boards (e.g. planning) Local Nature Partnerships Local Enterprise Partnerships
Multi-stakeholder partnerships (semi-statutory/ voluntary) - (FRM or sector-specific)	<ul style="list-style-type: none"> Local FRM partnerships (or sub-regional) Catchment partnerships District level operational partnerships/ groups Flood Action Groups / river stewardship (volunteer groups) LLFA regional forum Developers forum
Multi-stakeholder consultation/ workshops	<ul style="list-style-type: none"> National FRM strategy consultations Green Blue Infrastructure Strategy consultations
Multi-stakeholder project teams/ boards	<ul style="list-style-type: none"> Leeds Flood Alleviation Scheme (phase 1 and 2) A14 improvement project team Oxford-Cambs Arc
Forums / working groups / associations	<ul style="list-style-type: none"> ADEPT Flood and Water Management Group Water UK network (water companies) EA internal cross department groups Association of SuDS Authorities Association of Drainage Authorities (ADA)
Organisational restructure	<ul style="list-style-type: none"> Creation of Partnership and Strategic Overview teams in the EA LLFA teams within the local authorities' departments
Skills sharing/ training	<ul style="list-style-type: none"> Secondments (e.g. EA and local authorities, water company) Outsourcing staff/skills Training programme/projects
Joint conferences/ forums	<ul style="list-style-type: none"> Flood and Coast Conference led by the Environment Agency CIWEM Flood and Water Management forum National EA FCERM stakeholder forum
Collaborative working space	<ul style="list-style-type: none"> Programme Delivery Units (PDUs) – contractors and engineers Emergency coordination centres Desk sharing (e.g. LLFA and Planning Authority)
New coordinating agency or institution/ central steering unit	<ul style="list-style-type: none"> Lead Local Flood Authorities UK Flood Forecasting Centre Water Resources East
Coordinating individuals (boundary spanning staff)	<ul style="list-style-type: none"> Local levy funded coordinators/advisors Partnership chairs and coordinators Public engagement staff Flood risk managers/ PSO officers
Workshops/ meetings	<ul style="list-style-type: none"> Training exercises Bilateral in-person meetings and group meetings
Communication tools	<ul style="list-style-type: none"> Resilience direct (share data), websites (e.g. for public updates) Teleconferences (e.g. warnings), newsletters (e.g. EA updates)

4.3.2.2 Rule-based mechanisms

The following indicators were identified to assess the strength of the rule-based mechanisms – see list of the mechanisms identified in Table 4-4:

- Clarity and functionality of roles and responsibilities;
- Quality and flexibility of cooperation agreements;
- Enforcement and fit-for-purpose design of regulations/ tests.

In comparison to the actor-based mechanisms, the factors influencing the strength of the rule-based mechanisms for integration in FRM were less present in the literature and were developed more based on the evidence collected on FRM in England.

Clarity and functionality of roles and responsibilities: The first indicator identified is the clarity and functionality of actors' roles and responsibilities for FRM. This was identified as an important indicator because although rules are often adjusted, there is a risk that the appropriate training and resources are not available to transition such actors into their new roles. For example, as result of the Pitt Review (Pitt 2008) the FWMA (2010) set out new rules for FRM, including redistributing roles and responsibilities by clarifying the roles of the RMAs, establishing the LLFAs and localising the management of surface water flood risk. However, an ADEPT study revealed that LLFAs require significantly more funding to deliver their newly appointed role (demonstrated by the following quote). Additionally, some interviewees were found to argue that additional RMAs needed a statutory role for surface water risk to ensure developers take their advice on board, thus ensuring that rules are properly enforced. This demonstrates the dependence between the rule-based and resource-based mechanisms, which strongly emerges in the framework applications in Chapters 5 and 6.

Another piece of work I led on is the true cost of delivering the surface water drainage role. We are given 18K per year to deliver the statutory service, most of us [LLFAs] have 2 FEs [full time staff] working on planning applications and the actual need is around 150K. In the new burden assessment, we have contested, and we have tried to influence the next round of treasury rules to get more funding. (ADEPT representative N-01)

Subsequently, such rules can influence relationships by 'kick-starting' cooperation if they are mandated to do so, e.g. duties to cooperate (implemented in the FWMA) and help to give 'teeth' to discussions. However, it was found that these rules can be interpreted differently, sometimes resulting in less cooperation than hoped for, thus not functioning as expected. For example, during the regional LLFA meeting (PO-19) LLFA representatives

identified that some water companies (not those interviewed), although obliged to share data on their assets, only shared the bare minimum data (at postcode level) with LLFAs which was not useful for them.

Quality and flexibility of (cooperation) agreements: This indicator was identified as influencing the strength of rule-based mechanisms that support integration in FRM because of the varied effectiveness of different agreements and contracts in place between actors. Some scholars were identified to frame this as ‘collaborative procurement’ (Bakker et al. 2006). For example, the Public Sector Cooperation Agreements (PSCA) were recognised across actors as supported integration between IDBs and the EA related interventions, and the flexibility of the PSCA design allows for wider applications to support integration in FRM. Additionally, interesting contractual arrangements were identified between councils to share services and promote efficiency. For example, Staffordshire County Council perform the statutory consultee function for another council (N-11). However, conversely, framework contracts with suppliers and LLFAs were found to act as a disincentive for collaboration because of constraints in having to use their pre-organised contractors to do planned maintenance work (e.g. LLFAs using pre-established contact with the Highway Authorities suppliers). Although it was highlighted by interviewees that sometimes these can be overruled, as identified for Anglian Water to cooperate with an IDB and Highway Authorities for emergency flood response in Canby Island (CB-15). In such a way, contractual arrangements and other forms of agreements between actors should be sufficiently flexible to incentivise integration in FRM.

Quality of tests and regulations (fit-for-purpose and enforced): This indicator was selected because despite an abundance of regulations in place in England for FRM, they were found to have varied level of success, whereby many interviewees suggested there was a lack of effective design or enforcement. For example, the current areas that IDBs need to follow for collecting drainage taxes do not allow them to extend the area to collect tax from households in the upper catchment (N-02). Furthermore, the sequential and exception tests are designed to avoid development in the floodplains (MHCLG 2019b), however, many interviewees expressed their concerns that they are not being enforced sufficiently, and planning authorities manage to find loop holes around the regulations.

Yes, it is used [sequential and exception tests], but the planning authorities for all sorts of reasons don't want to, they have said 'this doesn't work' and then it gets overwritten. So when a planning inspector comes in and says 'well we desperately need the houses. Well, thanks for the info but no we need to crack on'. (ADA representative N-02)

Additionally, some regulations were found to conflict between water quality and flood management, causing confusion for farmers (N-05). The need for adjusted regulations to support integration between FRM and urban infrastructure was also found by other researchers, e.g. Ashley et al. (2013). In such a way, the presence and quality of the regulations in place will have an influence on achieving integration in FRM.

Table 4-4 Examples of rule-based mechanisms identified for FRM in England

Mechanisms	Examples
Legally modifying roles and responsibilities / organisational restructure	<ul style="list-style-type: none"> • Flood and Water Management Act (Risk Management Authorities and Lead Local Flood Authorities) • Civil Contingencies Act (Category 1 / Category 2 responders) • Agricultural Bill (farmers) • Rivers Authorities and Land Drainage Bill (IDBs) • SuDS Approval Body
Advice/consultation provision	<ul style="list-style-type: none"> • Statutory consultee role on planning applications • Statutory public consultation
Cooperation agreements/ contracts	<ul style="list-style-type: none"> • Memorandums of Understanding • Public Sector Cooperation Agreements • Framework contracts (e.g. EA Water and Environmental Management, water company, local authorities) • Data sharing agreements
Statutory cooperation rules	<ul style="list-style-type: none"> • Duties to cooperate (Risk Management Authorities, and Category 1 and 2 responders) • Powers to request information • Duty to respond (to specific hazards) • Compulsory Purchase Orders
Statutory tests/ impact assessments	<ul style="list-style-type: none"> • Sequential and exception test for planning development (including Strategic Flood Risk Assessment) • Strategic Environmental Assessment
Regulations	<ul style="list-style-type: none"> • IDB boundaries (for tax rating) • Environmental permitting • Flood risk activity permits • Biodiversity net gain • Adoption standards (Sewers for Adoption 8)

4.3.2.3 Resource-based mechanisms

As summarised in Table 4-2 the following indicators were identified to assess the strength of the rule-based mechanisms, a list of which is presented in Table 4-5:

- Availability and functionality of joint funding arrangements;
- Flexibility of sector-specific funds ('strings');
- Duration and continuity of funding sources (ability to combine/merge).

Similarly, to the rule-based mechanisms, the indicators identifying the strength of the resource-based mechanisms were less evident in the theoretical literature and strongly emerged from the evidence collected on FRM in England.

Table 4-5 Examples of resource-based mechanisms identified for FRM in England

Mechanisms	Examples
Joint funding arrangement	<ul style="list-style-type: none"> • Partnership Funding (capital investment programme – FCERM Grant-in-Aid) • Local authority – local levy fund (local taxes) • Highways England Designated Environment fund
Planning/ development charges	<ul style="list-style-type: none"> • Community infrastructure levy (on development) • S106 developers' contributions
Designated funding grants	<ul style="list-style-type: none"> • Community Resilience Pathfinder projects UK • Natural Flood Management (NFM) funding • Post flood event 'booster' funding
External funding mechanisms	<ul style="list-style-type: none"> • Growth Fund • European Structural Investment Funds (ESIF) • Network rail funds • Postcode lottery funds • Environment funds (grant-in-aid)
In kind resource sharing	<ul style="list-style-type: none"> • Shared equipment/ tools, staff time
Taxes/ rates/ contributions	<ul style="list-style-type: none"> • Roof tax for houses in flood risk zone (e.g. Somerset) • Drainage rates (IDB areas) • Community contributions to flood schemes
Revenue funding	<ul style="list-style-type: none"> • Funding local government generate (commercial services etc.)
Others	<ul style="list-style-type: none"> • Insurance (FloodRe) • Post-event household grants and compensation • Countryside stewardship (inundation payments)

Availability and functionality of joint funding: Joint funding arrangements (i.e. those collected from multiple actors) were found to be very useful in realising integration through developing joint knowledge and interventions for FRM, and also building capacity through additional staff. FRM funding in England has advanced in this regard. For example, the local levy combines contributions from local authorities and Partnership Funding incentivises funding from other partners (e.g. water companies, local authorities, private sector). Having such joint funding mechanisms in place allow partners to jointly decide how to spend the funds, however, the associated conditions were found to cause some

constraints. For example, the local levy was originally designed to support capital projects not studies and personnel, although this is a welcomed shift in focus it was found to take some persuasion of members of the RFCC (further explained in Section 7.3.3). Additionally, for Partnership Funding a constraint identified is the lack of recognition of benefits for different sector-specific partners (e.g. environmental, economic growth) and sources or risk (e.g. surface water). Furthermore, the benefits can be hard to disaggregate between partners, and thus determines how much funding each partner needs to provide, as shown in the example provided by Anglian Water.

The contribution we were asked for [via Partnership Funding] ... is 10% of what it would cost us to protect that asset [large sewer behind seawall]. It goes in swings and roundabouts and completely depends on the situation and what assets need protection and how it would be accepted. Sometimes we get very good value for money with that and other times our partners get good value for money. (Anglian Water representative CB-15)

Similarly, other studies have recognised constraints of Partnership Funding mechanisms (Thaler and Priest 2014). However, it was difficult to identify other examples of such joint funding mechanisms and the associated challenges across the FRM and broader policy literature.

Flexibility to combine FRM and sector-specific funding criteria ('strings'): Many of the funding sources identified were found to have numerous constraints (or 'strings') attached making it difficult to access or use for FRM related purposes. For example, for sector-specific funds (e.g. European Structural Investment Funds, S106 developer funds) the language of the bid request, the objectives, expected outputs and timelines and spatial boundaries for implementation, were found to not align with FRM funding mechanisms.

The Community Infrastructure Levy and S106 [developer funds] are bounded by the timing, area and feasibility studies – they just want them to deliver (National Infrastructure Commission representative, VE-02a)

Additionally, private companies will have some constraints on their ability to commit resources because of their regulator. For example, OFWAT the regulator for water companies require them to demonstrate value for money for their customers from any investment. Furthermore, it was identified that the changes to the OFWAT funding to allow water companies to spend more on operational funding (compared to capital funding) enabled them to work more on catchment management with farmers, thus building more supportive relationships that can work towards achieving better integration with FRM.

What was very striking was the number of catchment schemes that came in [after the change in funding approach] and this means that water companies are willing to go upstream and talk to

farmers and it meant that if a farmer builds a reservoir that the water company has more incentive to contract the farmer so they share it. That has started. (OFWAT representative N-04)

The challenges to align FRM and sector-based funding was similarly found by Morris et al. (2016) for agricultural payments. However, despite this indicator being strongly present through data collected in the interviews and participant observation, limited literature was found to be available to support it. This could indicate the lack of practice-based research on funding and FRM, in particular for supporting integration.

Duration and continuity of funding sources: This indicator demonstrates the need for resource-based mechanisms to have workable timelines for preparing and implementing interventions. Some literature was identified that recognises the need for longer duration committed funding sources for FRM implementation, for example the Delta fund in the Netherlands (van Alphen 2016). However, this indicator emerged more from the data on FRM in England. Some funding sources identified in England are only available as once-off settlements from the national government aimed at aligning different objectives e.g. Natural Flood Management funding, but without any long-term commitment. If funds are committed on longer timescales, such as the EA 6-year capital investment programme or 5-year investment cycles for water companies/network rail, then it makes collaboration easier between partners and provides flexibility to think more long term. However, for infrastructure providers it was identified that even keeping to such a 5-year time scale was challenging because longer time scales needed to be considered for such large infrastructure projects to take a more risk-informed view, as explained by a Network Rail representative in the following quote;

The other is the 5-year planning investment cycle and that is where you get strangled with long term thinking and that's the same in any regulated industry trying to push itself to think about 2 or 3 investment cycles. The only way a long-term sustainable solution works is if you think of whole life costing and it's easy to think about it and do it. Squeezing into a 5-year capital solution is difficult. (Network rail representative N-06)

Furthermore, a challenge identified is that different partners are typically working with funds on different timescales, an issue which is well-recognised in the infrastructure sector e.g. see Vallejo and Mullan (2017). For example, a representative from the West Yorkshire Combined Authority identified that they work within election cycles, but many projects cannot deliver within these timeframes, thus the projects are designed with suboptimal timeframes (LD-05). This makes it difficult for partners to join funding sources and work together to deliver integrated projects for FRM.

4.4 Assessing the realisation of integration in practice for flood risk management

The next dimension of the framework focuses on realising integration in practice through knowledge, policies and interventions, as identified in Section 2.3. These outputs for integration in FRM are expected to result from increased governance capacity for integration, while the process of developing the outputs and the learning generated from them is expected to further build governance capacity for integration. This section provides evidence to justify the relevance of the indicators more broadly for integration in FRM, which can be used to assess the high, moderate and low strength of these elements.

4.4.1 Knowledge

The first output for realising integration in practice is knowledge, as introduced in Section 2.3.1. The following indicators were identified, as shown in Table 4-6, to generate a more simplified meaning for strong, moderate and weak knowledge:

- Variety of actors involved in developing joint knowledge;
- Application of the knowledge to influence integration in FRM.

These indicators can be used to assess a single knowledge output or combinations. The following paragraphs provide evidence on the selection of each of these indicators from the literature and demonstrate their relevance for FRM using the data collected in England.

Table 4-6 Strength of knowledge in enabling integration

Strong	Moderate	Weak
<ul style="list-style-type: none"> • Strong variety of actors involved in developing knowledge (e.g. communities engaged, across generations, academia) and with sufficient in-house skills/capacity • High use of knowledge outputs to support integrated policies and interventions and to influence mechanisms 	<ul style="list-style-type: none"> • Some variety of actors involved in developing knowledge and mixed dependence on outsourced skills • Some use of knowledge outputs to support integrated policies and interventions and to influence mechanisms but could be improved 	<ul style="list-style-type: none"> • Poor mix of actors involved in developing knowledge (e.g. no communities engaged) and high dependence on outsourced skills • Poor use of knowledge outputs to support integrated policies and interventions and to influence mechanisms

Multi-actor knowledge development: This indicator emphasises the importance of co-developing knowledge with multiple actors to develop and understand different views of the problem to aid joint decision making, thus supporting integration in FRM. This indicator

is strongly evident in the literature on collaborative planning and (social) learning in theory and practice (Mostert et al. 2008, Newig and Fritsch 2009, Evers et al. 2012, Challies et al. 2016) and in the data collected on FRM in England. As identified through the interviews, integrated knowledge in the sphere of FRM was recognised as jointly developed models (e.g. between IDBs, water companies, EA), baseline studies and assessments (e.g. between universities, consultants), and guidance methodologies (e.g. SuDS implementation) – see full list of different knowledge types identified in Table 4-7. Although notable process has been made in England to develop joint knowledge bases, it was identified that there are still many knowledge gaps. For example, the lack of detailed knowledge on the effectiveness of NFM measures in specific catchments needs to be studied further to ensure the interventions do not lead to any negative consequences, as also identified in other studies (CaBA 2017, Environment Agency 2019d).

There needs to be modelling and analysis done to check how each catchment works. You don't want it [NFM] to cause issues. The catchment context needs to be understood. (NFU, national representative N-05)

Furthermore, the importance of having appropriately skilled actors involved or mobilised in generating the knowledge outputs was identified. Examples are as follows: the involvement of universities, the dependence of RMAs on consultants for outsourcing technical studies, and the direct involvement of communities and across generations to integrate local knowledge.

Knowledge application: The next indicator for knowledge is the need for the knowledge generated to be used as evidence or guidance to directly support the realisation of integration in practice for FRM or to help further build the governance capacity. This need for knowledge to be used to support integration, thus support continuous learning, is similarly recognised in the literature (Newig et al. 2010, Evers et al. 2012, Challies et al. 2016). Furthermore, the findings on FRM in England suggest that the extent to which this is completed will depend on the accessibility and suitability of the knowledge. For example, in Wisbech the EA developed detailed risk maps for the emergency services to plan evacuations more accurately, as similarly completed in Lincolnshire and allowed the maps to be freely accessible to wider actors e.g. Local Planning Authorities for use in flood risk assessments for planning. The value of such information is demonstrated in the following quote from an EA representative in Lincolnshire;

So people get it from us now for free even though we spent loads of money getting it. But now data is all free, so you improve the quality of the flood risk assessments and quality of the flood mitigation measures. But then also for the policymakers, you give them that additional knowledge which allows them to make a more informed policy and allows them to justify what some may seem as an extreme policy. (Lincolnshire Environment Agency representative CB-14)

In other cases, modelling was completed separately by different actors but in a way that allowed different models to ‘click’ into one another easily and can then be used for multiple purposes by different actors. This demonstrates the importance of generating knowledge that can be easily used by other actors to support joint efforts to enable integration in FRM.

Table 4-7 Identified types of knowledge and examples

Type	Example
Detailed studies or investigations	<ul style="list-style-type: none"> • Collaborative / participatory modelling • Understanding impacts on different sectors • Consultancy led studies (including mapping modelling – used within business cases/ proposals) • Projects within the working with Natural Processes Evidence Directory • Susdrain case studies • Wisbech coastal flood mapping (for evacuation planning) • Consequence mapping (east coast) for planning • Joint/connected modelling studies
Procedural frameworks	<ul style="list-style-type: none"> • Surface water management plan guidance • Preliminary Flood Risk Assessment guidance
Methodologies	<ul style="list-style-type: none"> • Network rail risk assessment guidelines for assets • Cost-Benefit Analysis (poor agreement on valuing agriculture, business, infrastructure)
Assessments	<ul style="list-style-type: none"> • National Flood Risk Assessment (NFRA) • Long-term Investment Scenarios (LTIS) • Preliminary flood risk assessment • Strategic flood risk assessment (SFRA) – level 1 and 2 • Water Cycle Studies • National Infrastructure Assessment • Weather Resilience and Climate Change Adaptation (WRCCA) impact assessment guide (for rail infrastructure investment)
Standards	<ul style="list-style-type: none"> • Design manual for roads and bridges (Highways England) • The SuDS manual • Design standards for rail infrastructure (Network rail) • Resilience standards (community resilience – Cabinet Office)
Guidance documents	<ul style="list-style-type: none"> • Development design guide e.g. Cumbria, Cambridgeshire • Local planning guidance (from water companies) • Emergency access and egress (by ADEPT) • ICE SuDS Route Maps
Databases/ portals for data sharing	<ul style="list-style-type: none"> • (joint) flood event database surface water – LLFA/ Anglian water • Resilience Direct

4.4.2 Policies

As introduced in the case study description in Section 3.5.1, there is an array of FRM, sector-specific and joint plans that if designed effectively, can be useful tools to realise integration in practice for FRM e.g. through joint objectives and interventions across actors. The following indicators were identified to assess the extent of integration in FRM and sector-specific plans:

- Availability of new/ joint plans;
- Alignment of objectives and interventions across plan boundaries;
- Consistency of timeframes for preparation, monitoring and renewal.

Table 4-8 uses these indicators to generate a simplified meaning for a strong, moderate and weak integration in FRM and sector-specific plans. In order to consider both the FRM and sector-specific plans, these are separated in the assessment. Table 4-9 highlights different FRM and sector-specific plans identified in England.

Table 4-8 Strength of FRM and sector policies in enabling integration

	Strong	Moderate	Weak
FRM policies	<ul style="list-style-type: none"> • Joint plans exist • Good alignment of objectives and interventions of FRM plans with other FRM and sector plan boundaries • Good consistency (i.e. ability to connect) of timelines for preparation, monitoring and renewal of FRM plans (with other FRM and sector plans) 	<ul style="list-style-type: none"> • Some joint plans exist • Some alignment of objectives and interventions of FRM plans with other FRM and sector plan boundaries • Some consistency of timelines for preparation, monitoring and renewal of FRM plans (with other FRM and sector plans) 	<ul style="list-style-type: none"> • No joint plans • Weak alignment of objectives and interventions of FRM plans with other FRM and sector plan boundaries • Weak consistency of timelines for preparation, monitoring and renewal of FRM plans (with other FRM and sector plans)
Sector-specific policies	<ul style="list-style-type: none"> • Joint plans exist • Good alignment of objectives and interventions of sector plans with FRM plan boundaries • Good consistency of timelines for preparation and renewal of sector plans with FRM 	<ul style="list-style-type: none"> • Some joint plans exist • Some alignment of objectives and interventions of sector plans with FRM plan boundaries • Some consistency of timelines for preparation, monitoring and renewal of sector plans with FRM 	<ul style="list-style-type: none"> • No joint plans exist • No alignment of objectives and interventions of sector plans with FRM plan boundaries • No consistency of timelines for preparation, monitoring and renewal of sector plans with FRM

The indicators can be used for single plans or groups of plans depending on the integration challenge identified for the assessment. When assessing FRM plans the focus is on their ability to integrate FRM and sector-specific goals, whereas for sector-specific plans the focus is their ability to integrate FRM goals. The following paragraphs provide evidence on the selection of each of these indicators from the literature and demonstrate their relevance for FRM using the data collected on FRM in England.

Table 4-9 Types of plans identified for FRM in England

Plan focus	Example
FRM focused plans	<ul style="list-style-type: none"> • National Flood Risk Management Strategy • Community flood plans • Regional Flood Risk Management Plans (RFRMP) • Catchment Flood Risk Management Plans • Local Flood Risk Management Strategies • Environment Agency Medium Term Plan • Multi-Agency Flood Plans • Surface Water Management Plans • Catchment (Flood) Management Plans e.g. Cumbria, Calderdale • Leeds City Region Flood Review / Calderdale Flood Review
Sector-specific plans	<ul style="list-style-type: none"> • 25 Year Environment Plan • Catchment Plans • Local plans (development) • Infrastructure investment plans • River Basin Management Plans • Asset Management Plans (water companies) • Drainage Strategies (water companies) • Long term Drainage and Wastewater Management Plans • Biodiversity Action Plans • County Council Strategies • Local Industrial Strategy (Clean Growth Strategy) • Strategic Economic Plan
Joint plans/ strategies	<ul style="list-style-type: none"> • Green Blue Infrastructure Strategies • Lincolnshire Local Enterprise Partnership Water Management Plan • Network Rail Weather Resilience and Climate Change Adaptation Plan (National) • Weather Resilience and Climate Change Adaptation route plans (local) • NFU Flood Manifesto

Availability of new/ joint/ overarching plans: The availability of joint plans that emphasise the connectivity between FRM and other sectors was found to be a good indicator for progress on integration between sectors as it offers a tangible output for actors to work on producing, as recognised by other researchers (Underdal 1980, Stead 2008, Candel and Biesbroek 2016). For example, new integrated catchment-based FRM plans have been developed by multiple actors on a case-by-case basis in England usually after significant

flood events, such as the Cumbria Flood Action plan (Environment Agency 2016c). Whereas, from a sector-specific perspective, the Network Rail Weather Resilience and Climate Adaptation Strategy (2017-2019) and Route Climate Adaptation Plans (Network Rail 2017) were identified as a good example of a specific plan integrating FRM objectives with rail infrastructure planning. However, some gaps still exist to align efforts of actors and enable integration for FRM, especially at a regional level. For example, the high number of local plans at the district level, and the lack of an overarching plan at a wider regional scale to connect the plans makes it difficult to identify opportunities for integration that span the plan boundaries - especially with large infrastructure/development projects upcoming like the Cambs-Ox Arc. This gap is demonstrated in the following quote;

You jump straight to local plans [from the National Planning Policy Framework] and you have 60 in our area and then we have challenges with housing growth as we are one of the fastest growing regions in the country, the fastest outside of London south-east. For the Cambs-Oxford Arc, it doesn't make sense to deliver that through lots of individual houses and connecting up bits of infrastructure. You need some kind of subnational plan that make sure you are tackling climate change, sustainable infrastructure, SuDS and Green infrastructure – that's the gap. (Anglian Water representative N-09)

Alignment of objectives and interventions across plan boundaries: The alignment of objectives and interventions across FRM related plans (different sources of flood risk and spatial boundaries) and sector specific plans (e.g. environment, economic growth) across the respective plan boundaries (which are unlikely to align) was identified as a means to support integration, as recognised by other researchers (Underdal 1980, Nilsson and Persson 2003, OECD 2015a, Candel and Biesbroek 2016). For example, the UK 25 Year Environment Plan was found to have strong alignment and vision connected to flood risk objectives and implementing NFM (HM Government 2018). Although FRM and environmental management focus on a catchment level, there are many overlapping boundaries across nature conservation areas and water company areas whereby challenges are expected, however, the positive move towards integration is evident, as highlighted in the following quote;

The Natural Flood Management agenda is massively enhanced, with the 25-year environment plan, everything seems to be much more aligned. I've definitely seen a shift. We were generally working in the old traditional isolation and that has taken a shift in focus. (ADEPT representative N-01)

By having interventions in one plan assigned to a particular organisation, which is replicated in that organisations sector-specific plan then there is a higher likelihood that it will be successfully funded by that organisation (or jointly with others) and implemented. For

example, the water companies were found to actively engage with LLFAs and the EA to identify opportunities for joint interventions in their Asset Management Plans (N-09).

Consistency of timeframes for preparation, monitoring and renewal: Overall the evidence from the interviews showed the challenges of aligning the array of plans especially considering their scattered timeframes for preparation, implementation and renewal, similarly recognised by other scholars (Stead 2008, OECD 2015a). For example, interviewees explained that because local FRM strategies and Regional FRM plans were prepared under different timelines it made it difficult to align monitoring efforts. However, where timeframes are aligned e.g. Water Framework Directive and Floods Directive related plans, interviews with the EA revealed that the upcoming revisions of the Regional FRM Plans and River Basin Management Plans aim to be more strongly aligned compared to existing plans. To do so, the EA are making sure there is crossover between objectives and measures across both plans in a particular place (N-11).

In addition, it was also identified that “*when you try to map all plan timelines your mind melts it’s so difficult*” (panellist PO-9), thus attempting to have all plans on the same timescale would be unworkable. For this reason, some shifts in the planning timelines is beneficial to feed into one another, as illustrated in the following quote;

I would argue that coordination comes more difficult if you are trying to do everything at the same time and some staggering of the process provides for some better coordination ... timelines should not discourage integration. (National Infrastructure Commission representative VE-02a)

In such a way, this indicator aims to emphasise the need for plan timeframes to enable input into one another consistently rather than all being exactly aligned. Overall, this sub-section demonstrated the different indicators needed to generate policies that enable integration for FRM. The next section builds on this to discuss the final element of integration in the framework – interventions.

4.4.3 Interventions

As discussed in Section 2.3.3 there is an array of FRM and sector-specific interventions that can be used to manage flood risk – some more targeted at preventing future risk, reducing existing risk or managing residual risk (Hegger et al. 2016). Furthermore, these interventions are typically interconnected with one another and have some degree of dependence, as recognised in the literature (Sayers et al. 2013, Dieperink et al. 2016, APFM 2017, Cumiskey et al. 2017). Based on the findings from FRM in England, a list of these

interventions was compiled and their interconnectivity with one another, as illustrated in Figure 4-4. For example, the uptake of Property Level Resilience (e.g. demountable flood gate) will be dependent on the incentives provided by insurance companies and its effectiveness will be dependent on receiving an early warning message and the availability of volunteers to spread the warnings. Another example is the dependence of pumping stations or reservoirs on receiving accurate forecast information for effective operation.

The purpose here is not to explain each arrow in Figure 4-4 but to demonstrate that there is a lot of potential synergies and trade-offs across different interventions applied at different spatial boundaries (e.g. catchment, administrative or geographical) and temporal scales (incident response, operational/implementation and/or strategic) that can be considered when thinking about integration across interventions in the context of FRM. This general interconnectivity is expected to be relevant to multiple flood risk governance contexts.

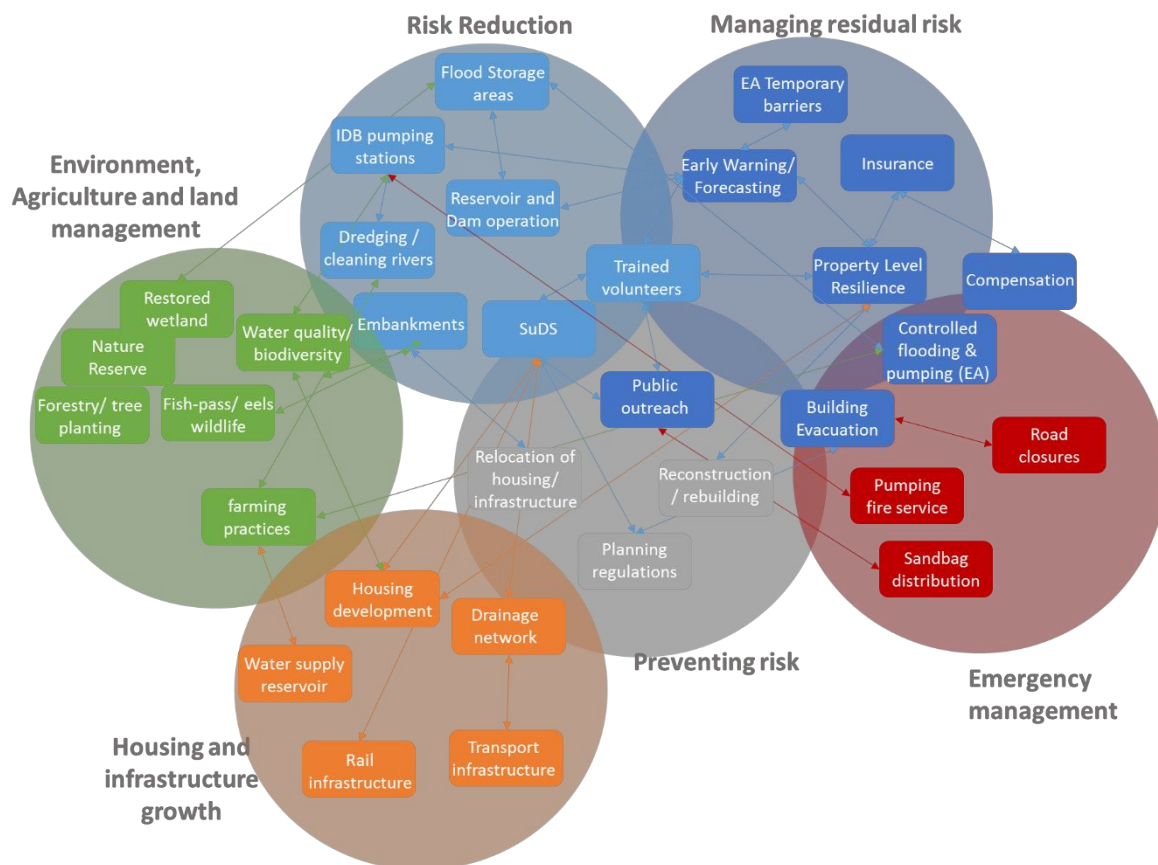


Figure 4-4 Types of interventions (for FRM and sector-specific) and their interaction

The following indicators were identified to assess the degree to which FRM, and sector-specific interventions are integrated:

- Maximised synergy;
- Managed trade-offs and side-effects;
- Maximised efficiencies.

Table 4-10 uses these indicators to generate a more generic meaning for strong, moderate and weak integration in FRM and sector-specific interventions. The possible influence of FRM and sector-specific interventions is considered separately in the table. These can be used as an aid to easily distinguish the strength of a specific intervention or for multiple interventions.

The following paragraphs provide evidence on the selection of each of these indicators from the literature and demonstrate their relevance for FRM using the data collected on FRM in England. These indicators were found to be broadly recognised in the policy and practice literature on FRM and related topics.

Table 4-10 Strength of FRM and sector-specific interventions in enabling integration

	Strong	Moderate	Weak
FRM interventions	<ul style="list-style-type: none"> • Significant synergies maximised and trade-offs managed for flood risk by accounting for interdependencies between FRM interventions across types of flood risk, spatial and temporal scales, and different phases • Significant synergies maximised and trade-offs managed within FRM interventions for sector-specific objectives • High resource and time efficiencies gained for FRM interventions 	<ul style="list-style-type: none"> • Significant synergies maximised and trade-offs managed for flood risk by accounting for interdependencies between FRM interventions across types of flood risk, spatial and temporal scales, and different phases • Trade-offs managed but few synergies maximised within FRM interventions for sector-specific objectives (only piloting) • Some resource and time efficiencies gained for FRM interventions 	<ul style="list-style-type: none"> • Some synergies across FRM interventions at different temporal & spatial scales • Trade-offs across interventions not managed in FRM objectives resulting in conflicts with sector objectives • Very limited resource and time efficiencies gained for FRM interventions
Sector-specific interventions	<ul style="list-style-type: none"> • Significant synergies maximised and trade-offs managed in sector interventions for flood risk objectives • High resource and time efficiencies gained for sector interventions 	<ul style="list-style-type: none"> • Trade-offs managed but few synergies maximised in sector interventions for flood risk objectives • Some resource and time efficiencies gained for sector interventions 	<ul style="list-style-type: none"> • No synergies maximised and trade-offs poorly managed in sector interventions for flood risk objectives • Very limited resource and time efficiencies gained for sector interventions

Maximise synergy and manage trade-offs – for FRM interventions: Practice-based literature on FRM demonstrates the need to maximise synergies and manage trade-offs across FRM and sector-specific objectives and interventions (Sayers et al. 2013, Lawson et al. 2014, APFM 2017). The evidence collected strongly supports this whereby interviewees identified the importance of FRM actors working together to capture synergies within FRM by looking across different phases (strategic planning, implementation/ operation and emergency response), different spatial levels (national to local) and temporal scales, for example, within flood protection schemes. Interventions like Natural Flood Management (NFM), Sustainable Drainage Systems (SuDS) and property level resilience (PLR), which require more integration across sectors (e.g. housing, environment, agriculture) are becoming more common to manage flood risk as part of FRM projects (Environment Agency 2019d). However, these less traditional interventions come with challenges, e.g. ownership of PLR and transfer of knowledge, and the adoption of SuDS and NFM features for long-term maintenance, as also recognised in the FRM literature (Ashley et al. 2013, Morris et al. 2016). This makes these interventions more uncertain in terms of their long-term effectiveness when compared to others e.g. new combined sewer overflow and diversion channels. Additionally, FRM projects were found to support the delivery of wider objectives, for example, in Cumbria building a flood storage reservoir was combined along with a nature reserve area as part of the Thaka Beck flood alleviation scheme helping to unlock additional environmental and amenity benefits (N-15). Additionally, FRM interventions were identified to mitigate negative effects on FRM or other sectors e.g. through compensatory or counterbalancing measures, such as including a fish pass and replanting of trees cut down as part of a flood scheme (N-12).

Maximise synergy and manage trade-offs – for sector interventions: The synergies and trade-offs for FRM can also be captured from a sector-specific perspective. Such challenges to do so within sector-specific interventions (e.g. growth and development) for FRM are recognised in the literature on planning, FRM and DRR (Hartmann 2016, Mcdermott 2016, Ran and Nedovic-Budic 2016). Furthermore, the evidence collected on FRM in England highlighted specific examples of such synergies. For the infrastructure sector, the A14 road improvement project led by Highways England, through their Legacy Fund, funded PLR measures for households along the route (N-10). Furthermore, catchment sensitive farming approaches and river restoration projects were found to be useful interventions to reduce siltation increase storage capacity of rivers, thus reducing flood risk. Highways England

(HE) were also found to have potential to bring in Partnership Funding to support a flood scheme that benefits their network too, for example, a scheme in North Yorkshire.

The scheme would have never been able to go ahead, with either one [EA], or the other [HE], but only because they joined forces. ... It was quite difficult at the beginning and there was a lot of head banging to get things going but it was a huge success and HE have seen the benefits of getting involved. (ADA representative N-02)

Additionally, sector-specific projects, such as road improvements need to mitigate any increased flood risk they might cause to neighbouring homes e.g. from increased highway runoff or a new bridge crossing the river at a critical point – as identified in the A14 road improvement project in England (N-10). Additionally, large housing and transport development projects need to be carefully planned to ensure they do not increase flood risk. For example, the Cambridge-Oxford Arc project aiming to deliver 1 million homes and transport improvements (East-West railway and Cambridge-Oxford Expressway) is constrained by large proportions environmentally protected and/ or flood prone land (MHCLG 2019a). However, it is challenging to capture these synergies and manage the trade-offs, when private sector interests are involved is challenging, as demonstrated by an LLFA representative in Cumbria;

We try to push for SuDS – open space acquiring land for infiltration, balancing ponds and swales etc. which have wider biodiversity and amenity value. That's a struggle to be honest, they [developers] want to squeeze in as many houses as possible into a site. (LLFA representative Cumbria N-15)

Efficiencies – FRM and sector interventions: The final indicator identified is the time and cost (in)efficiencies that actors can gain or lose from working together to implement integrated interventions, as recognised within other research (Bakker et al. 2006, Sayers et al. 2014, Alexander et al. 2016). These were found to range from cost savings such as closing a road for multiple purposes, or larger cost savings reducing the overall cost of the intervention from using the same contractors and consultants to implement the interventions, such savings are similarly recognised in other studies e.g. Foster et al. (2011). For example, when the water company were planning to conduct maintenance on their system, they would inform the Highways Authority so they could also conduct some maintenance work on their system which saves time and money. Further efficiencies were seen between the EA and the IDBs, where the IDBs can do additional work for the EA more efficiently. Another example of an efficiency captured between the EA and the catchment partnership host is explained in the following quote;

There are some fishing pegs we cut down the main wreaths, but we don't cut the fishing pegs. It won't take a huge amount of work while we are doing maintenance to do a bit around those fishing pegs. That's an easy win. Simple. You help with the tourism that side of things and fits in with the maintenance and doesn't cost us anymore. They are the simple things. (Environment Agency representative Lincolnshire CB-14)

Overall, this section demonstrated that there is a broad range of FRM and sector-specific interventions that can capture synergies and efficiencies across both FRM and sector-specific objectives (e.g. environment, economic growth) and minimise any associated trade-offs. These should be identified when assessing the degree to which integration is realised practice in FRM practice, along with other outputs – knowledge and policies, as described in the previous sections.

4.5 Summary

This chapter presented a framework for assessing integration in FRM for an identified integration challenge. Within the framework a qualitative meaning for a strong, moderate and weak element of integration (or component thereof) was proposed and a means to visualise these in an integration profile, as demonstrated in Figure 4-1. As explained in Chapter 3 (see Figure 3-3), this framework was built primarily based on the literature and evidence collected in the English case study but was supported by the evidence from the Serbian case study. This chapter focused on using broader examples from the data collected on FRM in England (i.e. from actors with experiences or remit wider than in Cambridgeshire or Leeds) to demonstrate the relevance and appropriateness of the key elements and indicators. In this way, the more detailed specific examples demonstrating the performance of the key elements and indicators, and their interconnectivity, are presented in the following chapters. Chapter 5 applies the framework to cross-sectoral integration challenges for FRM in England, whereas Chapter 6 demonstrates the transition from flood response to wider FRM strategies, in Serbia. Chapter 8 then uses the insights generated from the applications and patterns between the elements, to identify four degrees of integration (see Section 8.2).

Chapter 5 Assessing integration for flood risk management in England

This chapter applies the assessment framework developed in Chapter 4. It demonstrates how it can be used to generate profiles for the integration challenges identified for FRM in England (as explained in Section 4.2). Firstly, for integration internally within FRM across different sources of flood risk were considered. Secondly, for integration between FRM and the following sectors were considered: 1) emergency management sectors, 2) environment, land and agriculture sectors, and 3) housing and infrastructure growth. The critical interactions identified between the different elements of integration emerging from these profiles are then discussed. Lastly, the chapter provides further insights into the enablers and barriers for integration that emerged from the profiles. These findings are then used to identify four degrees of integration in FRM in Chapter 8. This chapter contributes to answering research question 2: *How can the assessment of these elements be used to identify integration profiles for different FRM integration challenges in different contexts?*

5.1 Current integration profiles

Within this section, an overview of the assessment and resulting integration profiles is presented. The results from the assessment of each elements are summarised at the beginning of each sub-section and completed with a summary outlining how the associated integration profile is expected to progress given the current governance capacity for FRM in England. The results presented in this section mainly draw on the evidence collected at the local level in England to test the performance of the key elements of integration (and associated indicators), specifically in the study areas of Leeds and Cambridgeshire. However, some evidence from the national level, results from the interactive feedback workshop (see Appendix H) and verification interviews are used as supporting evidence. In comparison, Chapter 4 demonstrated the broader relevance of the key elements and

indicators to highlight the framework using evidence from the English case study. Linking back to the tables presented in Chapter 4, the elements of integration are assessed more closely herein for each integration challenge. This includes the actor relationships (Table 4-1), influencing mechanisms (Table 4-2), knowledge (Table 4-6), policies (Table 4-8) and interventions (Table 4-10).

5.1.1 Flood risk management internally across sources of flood risk

The first *integration challenge* identified is the need to integrate within the FRM sector itself, especially to align efforts of multiple actors responsible for different sources of flood risk. As introduced in Chapter 3, the different sources of flood risk assessed include main river, ordinary watercourses, surface water (including from highways) and sewer flooding. Figure 5-1 presents the results from the application of the framework and subsequent integration profile. The evidence used to generate this assessment from the FRM sector was predominately drawn from interviews with Risk Management Authorities (RMAs), participation observation at FRM partnership meetings and a review of FRM documentation.

In summary, the evidence showed that the governance capacity for integration is generally high, and there has been a lot of progress since the implementation of the FWMA (2010) to improve *bonding relationships* between RMAs and implement a suite of predominately positively influencing *actor-, rule- and resource based mechanisms*, such as FRM partnerships, coordination staff, Public Sector Cooperation Agreements (PSCAs), and Partnership Funding. However, the evidence suggests that significant challenges remained in a range of areas. This includes, improving the *linking relationships* with the community, adjusting *rule-based mechanisms* to clarify roles and responsibilities for surface water management, while funding criteria within *resource-based mechanisms* need tailoring to better accommodate integration with surface water management interventions. This capacity led to generally high realisation of integrated knowledge developing an evidence base for *new plans* e.g. Surface Water Management Plans and aligned FRM plans e.g. local FRM strategies. *FRM interventions* were found to successfully gain efficiencies across main and ordinary rivers, however, more opportunities for aligning the management of river and surface water, through *sector-specific interventions* exist. Further insights and evidence into this integration profile are described within.

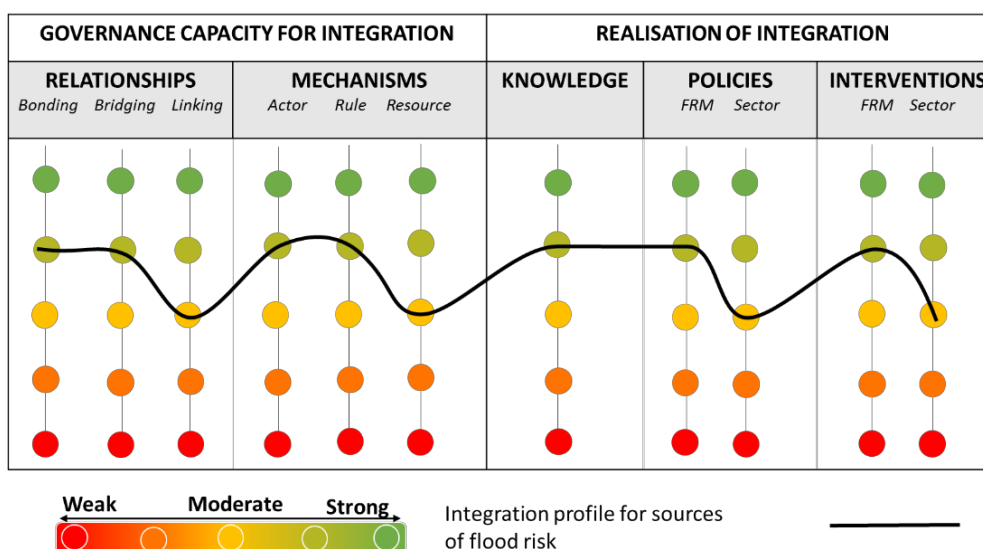


Figure 5-1 Integration profile for integration across multiple sources of flood risk in England

The *bonding relationships* were found to be strong between those with responsibilities for managing different sources of flood risk i.e. RMAs – Environment Agency, Lead Local Flood Authorities (LLFA), Internal Drainage Boards (IDB), water companies, highways authority and District Councils. In this case, the *bonding relationships* also represent the most relevant *bridging relationships* because they cut across sectors e.g. water companies, highway authorities (infrastructure) and IDBs (agriculture). These *actor relationships* strengthened through building a shared understanding of flood risk, willingness to work in partnership and increased communication intensity. As evident throughout the interviews with the RMAs, the EA has changed its approach in how it deals with partners, shifting their mind-set towards working with partners expressing a “Yes, if” rather than a “No, but” attitude which “ultimately comes to the same point but it’s a very different cultural approach.” (RFCC representative LD-14). Another example highlighting the change in organisational culture, is the relationships between LLFAs and the highway authority where the willingness to solve issues jointly has increased. This was identified in Leeds as illustrated in the following quote and similarly for Cambridgeshire;

If that had happened 10 years ago, it would have been, ‘well it’s your problem’. So now, there is definitely more of a link with people [from the LLFA]. (Highway authority representative Leeds LD-09)

Similarly, the EA’s relationship with IDBs was found to have greatly improved due to changes in organisational culture, combined with strong leadership from the Association of Drainage Authorities (ADA). There is now “far more an acceptance that the EA nor the IDB can do it alone” (N-02), whereby the IDBs were found to be supportive of the EA.

I'd say 10 years ago, the IDBs would criticise the EA and now we are very defensive of them. (IDB representative CB-05)

This improvement was found to be strongly connected to the implementation of Public Sector Cooperation Agreements (PSCAs) (*rule-based mechanism*) which enabled the EA to contract the IDBs to conduct maintenance on main rivers, in a more efficient way utilising their equipment, skills and local knowledge, as demonstrated by the following quote;

For ages and ages, we said look we can help you [EA] and we can do this and there was no way of making that happen. So that [PSCA] bypassed all of the framework contracting and all of the legal difficulties that enabled us to work together. (IDB representative CB-05)

Similarly, the water company's relationship with RMAs was found to have strengthened, however, this varied from one region to another. Anglian Water was strongly recognised by interviewees for their particular openness and willingness to work jointly through dedicated staff (*actor-based mechanism*) to engage in bilateral discussions with partners and attend FRM partnership meetings in their region (e.g. local FRM partnership, RFCC) (CB-05; CB-16; CB-17). This increased communication intensity was found to facilitate Anglian Water's ability to capture opportunities for joint projects.

We have a very good man at Anglian water now. It was awful before you couldn't even get them to attend the meetings before, so that is down to an individual more than the business I would suggest. He has been superb. (IDB representative CB-05)

Overall, these relationships between RMAs were found to improve due to moderate to strong *actor-based mechanisms* (as shown in Figure 5-1) alongside the implementation of the FWMA (2010). The establishment of Partnership and Strategic Overview (PSO) team enabled the EA to support capacity building and training of LLFAs, in particular to transfer the surface water drainage statutory consultee role and to develop a programme of work for FRM interventions (CB-09). From the LLFAs side, the establishment of FRM partnerships (e.g. the Cambridgeshire FRM partnership), or at a sub-regional level (e.g. West Yorkshire FRM partnership) were found to increase communication intensity among actors and strengthen their relationships.

I think the partnerships are the best thing that has come out of the act [FWMA]. (Cambridgeshire LLFA representative CB-17)

Furthermore, the RFCCs were found to play an important role in bringing actors together to share knowledge and align mind-sets, beyond their formal role to approve FRM interventions across multiple local authorities in the region, as illustrated by the following quote;

Perhaps the real interest, and potential, of what RFCCs can do is that they are part of the glue that joins other elements together. Whilst they have a formal role, they also have an informal one that sometimes includes being a catalyst for things to happen. (Yorkshire RFCC chair LD-07)

In addition, a gap identified that hinders the full impact of such partnerships is the lack of engagement of community representatives, thus influencing the *linking relationships* (with riparian owners, landowners, councillors, general public and volunteers/flood group members). The limited presence and/or availability of such individuals was found to make it difficult to ensure participation. This was identified for the Yorkshire RFCC where they have invited flood action group members to engage through presentations and are encouraging more participation of communities in the sub-regional partnerships.

I'm conscious that ... [administrative and political] boundaries are often different, and it can be tricky to identify who you should engage with. This is why the sub-regional partnerships [e.g. at West Yorkshire level] might be the better place to have them [community representatives] involved. (Yorkshire RFCC chair LD-07)

Furthermore, the RFCC does serve as a platform for councillors to raise concerns of their constituents, although it was identified that they need more capacity building on flood risk to ensure unified messages are being shared with the community. This is something that an initiative within the Yorkshire RFCC (called SCRIMP) aims to achieve (LD-03; PO-4). For these reasons, the *linking relationships* were identified as moderate strength in Figure 5-1.

Similarly to the example provided about the relationship between water companies and RMAs, the availability of dedicated staff from RMAs were found to be essential for building relationships with communities. In Cambridgeshire LLFA, this role was added on to an already over-stretched role, limiting their ability to establish and support flood action groups in the area (CB-12; CB-17). Given this scarcity of staff, the EA and LLFA officers were found to collaborate and support one-another, often outside of their core responsibilities, on either surface or main river flooding, to capture efficiencies e.g. joint trainings (CB-12). Outside of the study areas, good examples of such dedicated jointly funded roles for community engagement were identified e.g. Northumbria (VE-05) and community representatives on the RFCC in the Northwest (N-15). Another challenging *linking relationship* identified is between the RMAs and landowners and/or riparian owners regarding the clarity of roles and responsibilities (*rule-based*). The RMAs explained that many riparian owners do not understand their obligations to maintain ordinary watercourses and ditches on their land, resulting in complex engagement procedures with multiple landowners (CB-17; LD-02). Furthermore, a lack of clarity on the role of different RMAs

in responding to surface water events was identified and is further discussed in Section 5.1.2 on emergency management.

The findings showed that there is good availability of joint funds (Partnership Funding and local levy), some constraints were identified that limit their functioning especially for surface water flooding schemes. For example, the Partnership Funding was found to be very successful in joining main river schemes between the EA, IDBs and WCs, however, it was found not to function well for surface water schemes because they cannot reach the cost-benefit ratio, as demonstrated in the following quote from February 2018.

The Partnership Funding system doesn't work very well for surface water flood risk ... the benefits are just not enough for scattered individual houses across the area. It's easier to prove the benefits for a larger scheme that protects large numbers of houses. (Cambridgeshire LLFA representative CB-17)

Furthermore, some limitations within OFWAT funding rules for water companies (i.e. demonstrating benefits to customers) hinder their ability to contribute resources to Partnership Funding for FRM projects (CB-15). This limited cost-effectiveness was demonstrated in their review of the water companies' business plans (OFWAT 2019), and as highlighted for Yorkshire Water in the following quote;

What we're actually finding is that even though they [Yorkshire water] agree with the principle that scheme could be done jointly, quite often marrying up the priorities to release some joint funding is quite difficult. (Leeds LLFA flood risk manager LD-02)

The local levy fund was identified as a useful joint-funding mechanism to (co)fund the delivery of surface water schemes, studies and investigations, and even more creatively, such as jointly funding staff that support integration in FRM. However, it was traditionally seen as a funding mechanism to 'top-up' funding for flood schemes (CB-01; VE-05; VE-06). This transition to its more flexible use was found to be widely welcomed by RMAs, although some RMAs felt that the boundaries of this flexibility could be further pushed.

The local levy is a great idea and I think it could be used even more flexibly. It is reasonably flexible, but I think it could be used even more creatively. (Aire and Calder catchment partnership host Yorkshire LD-03)

Overall, the *resource-based mechanisms* were found to be of moderate strength (lower than the other mechanisms), as shown in Figure 5-1.

As a result of this increased governance capacity for integration, significant progress was notably made on jointly improving the risk *knowledge* for multiple sources of flood risk, thus is identified as moderate to strong in Figure 5-1. Anglian Water expressed their current

openness to sharing data and models with their partners, which they did not do before (CB-15), indicating a change in their organisational culture. Furthermore, in Leeds it was identified that efforts are being made across the EA, LLFA and Rivers Trust to generate a full catchment scale model of the River Wharfe, demonstrating a new collaborative approach.

They [EA] had already instigated some modelling work on the lower bit [of the River Wharfe] so for our bit we were tempted to make sure that it fits nicely within that so then we have a full catchment scale. This way we don't have to get one consultant to do it all, but they can plug into each other. (Leeds LLFA flood risk manager LD-02)

However, from a skills point of view, it was identified that there is a still strong dependence on external consultants to generate a lot of the risk knowledge (e.g. flood risk assessments, studies) which is used for preparing FRM project proposals (business cases). This is due to a lack of skills and capability in LLFAs, a challenge which was broadly recognised by interviewees (CB-17; LD-07; VE-01; VE-06), as demonstrated in the following quote by an RFCC chair. However, larger LLFAs, such as Leeds City Council are better able to build this capacity because of the number of projects they have running (LD-02).

I think that one of biggest challenges that we have is that of capability and capacity, almost as much as financial resources. We can struggle to spend the money when we don't have the capacity to develop robust business plans and to address assurance issues etc. (Yorkshire RFCC chair LD-07)

This knowledge was found to be used to support the development of new FRM plans e.g. Local FRM Strategies, and Surface Water Management Plans (SWMP), and sector-specific plans e.g. Water Company Asset Management Plans (AMP), and thus support the implementation of joint interventions. For example, in Cambridgeshire, having a SWMP in place made it a lot easier for them to capture joint opportunities for flood management schemes with water companies through their Asset Management Plan utilising Partnership Funding (CB-15).

Overall the *FRM plans* were identified as moderate to strongly integrated in comparison to the *sector-specific plans* as moderately integrated, as shown in Figure 5-1. Despite the regional FRM plan being in place, the EA's medium-term plan (where the interventions are listed and updated yearly for the 6-year capital investment programme) was identified as the most stringent plan that LLFAs and other RMAs monitored closely (during RFCCs) because it connected to their investment programme for the following year. Building a base of knowledge was an important part of deciding on interventions and found to be crucial for forward thinking of bids to be ready when funding opportunities arise. As such, having a

clearly identified and agreed ‘pipeline of projects’ was important, which initially the LLFAs in the Anglian Great Ouse region did not have, as illustrated in the following quote;

About 2 years ago the committee [Anglian Great Ouse RFCC] had a large pot of money but nothing to spend it on. We went along to the committee and said well there must be the need through your authorities to spend this money and they said, ‘well we don’t know how to spend it’. (EA Great Ouse catchment representative CB-09)

Although some community flood plans were in place, these were found to be more focused on emergency management (further discussed in Section 5.1.2). Overall, the *FRM interventions* were found to be more integrated than the *sector-specific interventions*, as shown in Figure 5-1. The 6-year investment programme (coming to a close in 2021) delivered a large number of FRM schemes to better protect 300,000 homes (Environment Agency 2019b). However, within many areas, interventions such as SuDS (further discussed in Section 5.1.4), Property Level Resilience (PLR) measures, Early Warning Services and preparedness measures were found to be of growing interest to actors, especially to deal with surface water flood risk and the residual risk from main rivers. In the Great Ouse catchment, they have delivered the majority of their larger scale schemes (for main rivers) and now need to focus on smaller scale schemes (often for surface water risk), as demonstrated in the following quote.

So in this area we’ve largely delivered most of our big schemes so it’s now focusing on those small schemes that effect small numbers of properties but affect a small number of properties really regularly or really seriously where it is very difficult to actually get the money to pay for it so we’ve got schemes where we’ve been working with the community and the community have said ‘this is what we want to happen’. (EA Great Ouse catchment representative CB-09)

In this way, these types of schemes require more engagement with communities. Unfortunately however, such community engagement has no dedicated sustainable funding source (*resource-based mechanism*), apart from the Pathfinder funds from Defra for community engagement which some LLFAs accessed (Twigger-Ross et al. 2015). Therefore, the majority of LLFAs need to creatively ‘tag on’ community outreach to other projects (CB-12). However, such piecemeal engagement is likely insufficient to build stronger *linking relationships* to support effective implementation of interventions for FRM.

FRM interventions were found to have high efficiencies resulting from the increased governance capacity for integration. For example, the PSCA led to £1.2m savings in efficiency due to the strong collaboration on the maintenance across main and ordinary level rivers (Russel 2018). The trade-offs between interventions, ensuring that the wider impacts are considered were found to be accounted for and synergies captured.

So yeah, it's not just taking it at face value, you need to be doing more here, and you've actually got to look for the area around that because for somebody it might be good but for someone else it might not be good. You have to look at the dependences. (EA Great Ouse catchment representative CB-09)

Overall, this integration profile, represented a positive example of integration with relationships strengthening amongst actors, observed through the FRM partnership related meetings and interviews with RMAs. This challenge demonstrated that progress on integration is achievable over time, whereby it has been roughly 10 years since the FWMA was implemented. However, it requires a mix of carefully designed *actor-, rule- and resource- based mechanisms* to build strong *actor relationships*, commitment to generating *knowledge* and delivering *interventions* in practice. Furthermore, there is a clear sense of momentum in place among RMAs to fill the remaining gaps for achieving integration in practice (e.g. funding criteria, staff for community engagement). Additionally, the (draft) National Strategy on FCERM (Environment Agency 2019b) and the new EA capital investment programme (2021 onward) offer ample opportunities to strengthen the gaps and realise more integration in practice for FRM.

5.1.2 Emergency management

The second *integration challenge* identified is the need for integration between FRM and emergency management sectors. Emergency management in England involves the preparation, response and recovery to a situation or series of events that threatens or causes serious damage to human welfare, the environment or security (e.g. adverse weather, severe flooding, animal diseases, terrorist incident). It is undertaken as advised in the Civil Contingencies Act (Cabinet Office 2004) covering a broader range of risks than natural hazards such as floods. The emergency management sector locally brings together Category 1 (including EA and local authorities) and Category 2 responders (including utility companies) to collaborate through the Local Resilience Forum (LRF). There is a natural connection between FRM and emergency management, whereby both sectors aim to protect and prepare society from flooding yet on different timescales or phases. The FRM and emergency management sectors operate under different ministries and are guided under different legislation, however, there are distinct areas where they overlap in preparing for and responding to flood events. For this reason, integration between both sectors can help to capture synergies for achieving both sectors objectives.

Figure 5-2 presents the results from the framework application and the subsequent integration profile. The evidence used to generate this assessment from the emergency management sector included, interviews with emergency managers (within local authorities), fire service, police, EA representatives, participation in a LRF sub-working group and a review of a Multi-Agency Flood Plan. The evidence showed that there is good integration between FRM and emergency management during the response to flooding. However, more opportunities exist for integration with FRM during the preparedness phase. The *actor- and rule-based* mechanisms did not discourage integration but do require improvements to further enable integration e.g. more PSCAs, clarity on roles, and extended membership/engagement in partnerships. Despite generally strong relationships between actors, the lack of *resource-based mechanisms* acts as the critical gap, leaving emergency management actors with limited capacity to fully capture opportunities to maximise synergies and efficiencies in knowledge generation and across *FRM and sector-specific interventions*. Therefore, FRM joint funds (e.g. local levy) need to be more accessible to emergency management actors, while the emergency management sector requires new funding mechanisms to encourage integration with FRM. Additionally, the Multi-Agency Flood Plan could be more effective in practice if additional risk knowledge was integrated. Similarly, FRM plans and interventions (e.g. EWS, property preparedness) could become more efficient if there is stronger integration with emergency management, especially moving forward towards community resilience and implementing a broader mix of interventions, as advocated for in the Draft FCERM National Strategy (Environment Agency 2019b). Further insights into this integration profile are described within.

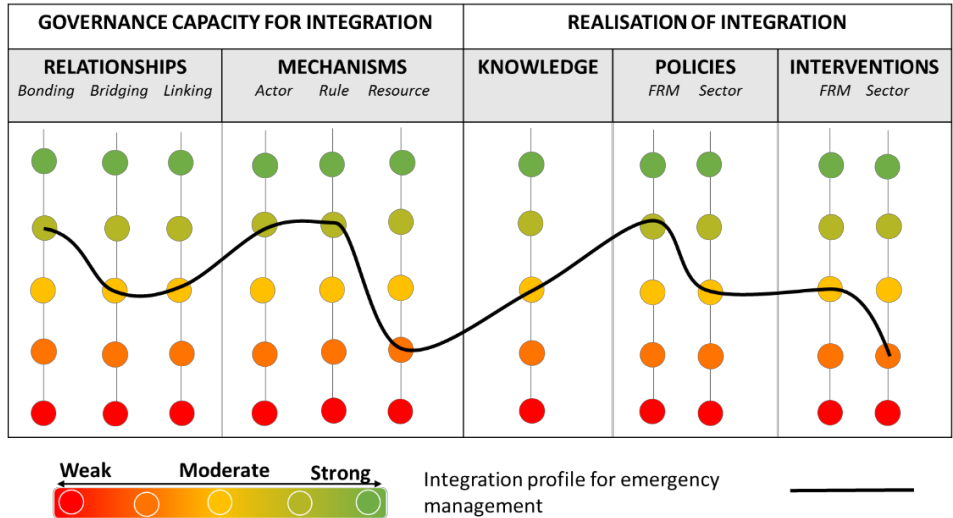


Figure 5-2 Integration profile for FRM and emergency management in England

As shown in Figure 5-2, strong to moderate *bonding relationships* were identified between Category 1 and Category 2 responders who collaborate through the Local Resilience Forum (LRF) and associated working groups as required under the Civil Contingencies Act (2013). Furthermore, resilience direct (online platform) is used for LRF members to communicate, share data and update information in plans, helping to capture lessons after events, as demonstrated by the following quote;

There are a lot of lessons to be learned and I think those lessons have been learned through the LRF and we have improved our communication (Emergency management representative Leeds LD-06a)

Similarly, *bridging relationships* with RMAs (many of whom are also Category 1 or 2 responders) were found to have aligned mind-sets and willingness to work together on flooding. However, greater efforts can be made to increase communication intensity with LRF members, in particular, the cross-linkage with colleagues on FRM focused teams and neighbouring local authorities. The water companies, the local authorities and the Environment Agency have emergency management focused teams and usually different individuals will attend the LRF and FRM partnership meetings (CB-10; CB-01). In comparison, the IDBs are not involved formally with the LRF because they are not a Category 1 or 2 responder, thus the emergency management sector is missing opportunities to capture efficiencies by utilising their local knowledge, skills and equipment.

Additionally, not all RFCCs or local FRM partnerships have emergency management representatives or have emergency management as has a dedicated agenda item. For example, in the Anglian Great Ouse RFCC, there was no LRF representative present and no specific emergency management updates were discussed. In the Anglian Northern RFCC and the Yorkshire RFCC, emergency management update papers were a regular item on the agenda and prepared by the EA representative and sometimes other emergency management actors would be invited to give a presentation. However, communication outside of the partnerships was also found to be important, for example in FRM focused training the LLFA tries to pull in the local authority emergency management team to understand what they are doing and identify areas for collaboration (CB-17).

Although emergency managers expressed a strong willingness to work with partners on FRM, the lack of *resource-based mechanisms* within the emergency management sector and resulting staff constraints, limited their ability to engage, as illustrated in the following quote;

We were, to give you a flavour, I started here, at the very end of 2009, and I think there were 12 on the team, and as of now there are 3 of us. (Emergency management representative Cambridgeshire CB-06a)

The only joint fund identified is within the LRF and used specifically to fund a secretariat for the partnership, not projects or studies (CB-11). For this reason, more joint funds are needed that incentivise integration, either from the FRM or emergency management side. In addition, these needed to be committed long-term unlike the time limited nature of Pathfinder project funding (Twigger-Ross et al. 2015). As a result, the staff constraints limit their ability to support community engagement and strengthen *linking relationships*. Overall, *resource-based mechanisms* were found to hinder integration, thus represented as weak to moderate strength in Figure 5-2.

The *rule-based mechanisms* were found to be moderate to strong because duties for response are well defined through the Civil Contingencies Act, however, some gaps were identified to enable stronger integration with FRM. Firstly, there is no one organisation legally required to respond to surface water incidents, resulting in an uncoordinated approach when the public call multiple organisations e.g. water companies, highway authorities, EA and LLFA. Furthermore, the emergency management team in the local authority will only get involved if an event is declared an emergency, and the flood depths for surface water typically do not warrant this (CB-17). As a result, coordination for surface water flooding incidents is a challenge across RMAs, and thus requires more agreed processes for communication between RMA teams and interaction with communities (CB-17).

Another regulatory gap identified is around the responsibilities to conduct flood preparedness activities and outreach with the communities. As described in Section 5.1.1, this is currently a joint effort by the LLFA and the EA, however, the LRF members do have the responsibility for ensuring that communities are ‘warned and informed’ under the CCA but this was found to be interpreted in different ways. Due to the scarcity of resources, in most cases the local authority’s emergency management team do not have time to dedicate to community engagement on flood preparedness, despite there being opportunities to align with their own outreach e.g. on fire safety. The final regulatory gap is the lack of clarity around the responsibilities for emergency managers to review access and egress plans (evacuation plans) within planning applications (CB-06; N-01). However, there is a concern that currently emergency managers would not have the skills or resources to do it effectively (N-01).

Furthermore, the flexibility of the rules was shown when the permissive power to manage main rivers was transferred from the EA to Leeds City Council FRM team to operate the Leeds Flood Alleviation Scheme including operational weirs (LD-02). Strong communication is in place with the EA on forecasting and warning but interestingly, the LA-emergency management team is not involved in the operation of the scheme but are kept informed and can support if needed. Again, this demonstrates that the local authority emergency management team's knowledge is focused on responding to floods and not necessarily managing and/or preparing for flood risk.

Another area for reflection is the relatively weak integration of knowledge and interventions between FRM and emergency management sectors. This finding suggests that the emergency management sector is still not drawing sufficiently on the knowledge and expertise (e.g. detailed modelling), resources (e.g. IDB equipment) and the funding opportunities available within the FRM sector to enable more efficient and effective interventions e.g. evacuations, road closures and placement of temporary defences. Typically, knowledge from events is used to update the Multi-Agency Flood Plans (MAFP) on a yearly basis rather than detailed risk modelling. However, a positive example was identified in Wisbech, Cambridgeshire where the East Coast Flood Plan (new plan) was updated with new risk modelling to make the evacuation more efficient, as described in the following quote;

Within the Wisbech coastal flooding, they are about to start a piece of work to help us if we need to do evacuations or draw downs, so at the moment we have huge number of potential properties ... it will mean that we can be much more specific, so we are looking at less properties, so it's more doable and we can do more prep work. (Emergency management representative Cambridgeshire CB-06)

Another gap identified was in aligning interventions across neighbouring LRF plans, (e.g. Kirklees and Wakefield in the West Yorkshire region) to support each other (LD-06), and the lack of inclusion of community flood plans (e.g. with lists of volunteer contacts) with MAFP and Resilience Direct (CB-11; LD-06). For these reasons, the strength of integration with emergency management in the FRM plans is assessed as moderate to strong, and in sector-specific plans as moderate, as shown in Figure 5-2

FRM and the emergency management sector have some overlap in the interventions available for response to flooding and thus need to be coordinated. An example of this is how the EA operate their own pumps, flood early warning systems and temporary barriers. However, these interventions need to be implemented in coordination with those from other

emergency management actors' response, such as the highways authority closing roads and distributing sandbags, and the fire service using their pumps. Resources from all actors were found to be typically utilised during incidents (e.g. vehicles, pumps) especially because the local authority emergency management team have no equipment, but there is not always an awareness of the potential synergies. An example of this is not knowing that the fire service has amphibious vehicles that can support the response efforts, as identified in West Yorkshire (LD-10). This links back to the need for improved *actor- and rule-based mechanisms* to improve FRM and LRF partnership membership and the opportunity to utilise more cooperation agreements with different actors (e.g. PSCA with IDBs). Furthermore, the effectiveness of these measures was found to depend highly on local circumstances, indicating the need for more joint knowledge – as demonstrated by the following quote relating to pumping;

There are question marks around the effectiveness of pumping, not that it doesn't work but we had a situation, with storm Eva where a river overtopped into a horseshoe area, it was banked and there was nowhere for the water to go to. (Emergency management representative Leeds LD-06)

Additionally, there are movable barriers/ temporary defences (national support measures from the EA) available in the Anglian region, and similarly in West Yorkshire, but interviewees recognised the challenge to know where to put them, who to install them and the timing constraints for their installation (LD-12; CB-01). This demonstrates a knowledge gap which the FRM and emergency management actors could jointly fill. Furthermore, the interviewees, both from FRM and emergency management sector, shared a common understanding that sandbags are not an effective means of managing the risk compared to more innovative solutions e.g. water sacks (as implemented by flood action group members in Garforth Leeds). However, as demonstrated in the following quote, many members of the public see them as the only solution frustrating RMAs, thus more outreach and engagement are required to change this mind-set and build stronger *linking relationships* with communities.

Whenever people [public] ring up, all they ever want is sandbags, so there is an awareness issue and it really does my head in. (Highway authority representative Leeds LD-09)

This demonstrates that the knowledge gap is not only about technical physical interventions but also related to risk communication and behavioural change. Given the ability to capture some efficiencies across FRM and emergency management interventions, these are identified as moderate strength (for FRM), and moderate to weak (for emergency management) as shown in Figure 5-2. This is because although FRM and emergency

management coordinate during events, their interventions in the preparedness phase (e.g. community outreach, risk mapping and modelling effectiveness of interventions) offer more opportunities to capture synergies for both FRM and emergency management.

Overall, this integration profile showed that integration between FRM and emergency management is functional with aligned mind-sets among actors that result in some joint interventions and efficiencies. However, more opportunities can be captured on both sides to realise more synergies in practice. Similarly, to the first challenge, this profile demonstrated importance of strong engagement with the public and the need to integrate more risk knowledge into emergency management planning and interventions. This knowledge gap has also been identified by other researchers, for example Alexander et al. (2014) developed an innovative tool to help knowledge exchange between FRM and emergency management professionals. However, the critical factor hindering integration between the sectors was identified as the lack of *resource-based mechanisms*. This was also recognised in the government's response to the Multi-Agency Flood Plan review stating that "*it is necessary to examine the balance of capital and resource funding, in order to make sure that the capability for emergency flood response needs is met.*" (Defra 2019a p. 3). This can be addressed by both the FRM sector (e.g. increasing use of local-levy, staff on joint community engagement) and the emergency management sector (e.g. new LRF joint fund for knowledge and staff). It is expected that in the short-term the push for integration will be driven by adjustments to the FRM sector mechanisms (e.g. membership on partnerships, utilising PSCAs) and later to developing new or adjusted emergency management sector-specific *rule and actor-based mechanisms* that support integration for FRM. This is especially important as effective preparedness and response continues to gain importance moving towards 'resilience standards' and the recognition that everyone cannot be protected from floods, as shown in the Draft National FCERM strategy (Environment Agency 2019b).

5.1.3 Environment, agriculture and land management

The next *integration challenge* identified for FRM in England is between FRM and the environment, agriculture and land management sectors to manage flood risk while mitigating, and where possible enhancing, the state of the environment and productivity of land. Integrating these sectors can bring benefits to the environment around the provision of ecosystem services, for agriculture by increasing income from land e.g. payments for

maintaining Natural Flood Management (NFM) interventions, and for flood risk to reduce runoff rates and increase storage in the catchment. This integration challenge has grown in significance since flood events exposed the need for a more catchment-based approach and thus resulting in a growing discourse around working with natural processes and implementing NFM interventions (Environment Agency 2019d). Figure 5-3 outlines the integration profile assessed including data collected from the environment and agricultural sectors, including representatives from catchment partnerships, EA, Defra, IDBs and the National Farmers Union.

This integration profile demonstrates the significant progress made on integrating FRM with environmental and agricultural sectors in England. Similarly, to the profiles described above, the importance of improving *existing actor-, rule- and resource-based mechanisms* is highlighted to enable more integration both from the FRM and sector-specific perspective. The profile illustrates the significance of *knowledge* development and piloting/testing joint *interventions*. However, the pace at which this knowledge is produced is influencing the ability to appropriately design and tailor *rule- and resource-based mechanisms* (e.g. maintenance arrangements and funding criteria). Although mind-sets are typically aligned, the FRM sector typically dominates over the environment sector within Defra (due to its higher funding), limiting the communication intensity across actors. This demonstrates the need for the FRM sector to make extra effort to capture the joint opportunities and use existing *actor-based mechanisms* (e.g. partnerships, staff) to realise integration in practice for both sectors. Further insights and evidence are described herein.

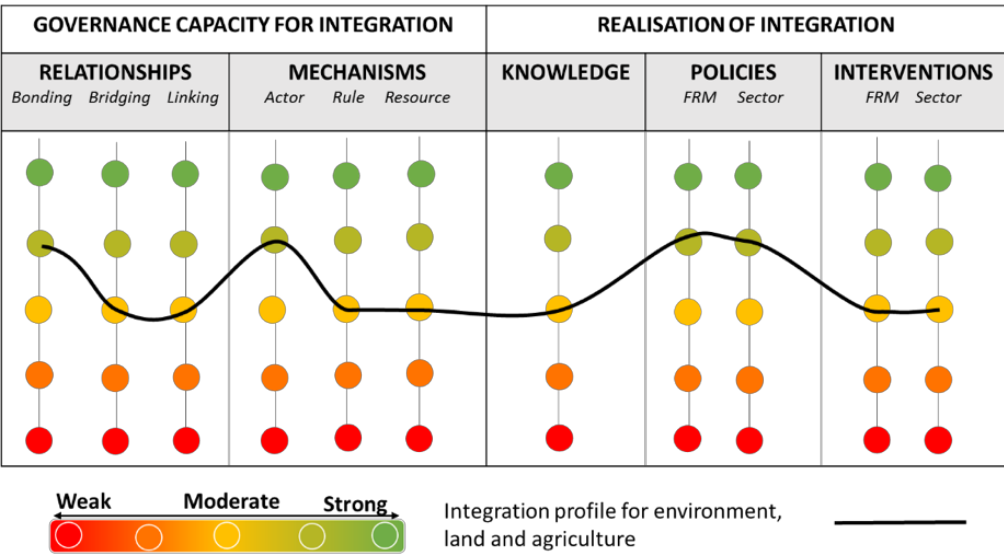


Figure 5-3 Integration profile for integration between FRM and environment, land and agriculture

The *bonding relationships* between actors responsible for environment and agricultural objectives (e.g. environmental NGOs, EA-environment team, National Farmers Union) were not the focus of the assessment, however, were assessed as moderate to strong. More importantly, the *bridging relationships* between the RMAs and the actors were found to have generally aligned mind-sets, and willingness to work together but mixed levels of communication intensity, thus identified as moderate strength, as shown in Figure 5-3. However, the ability to align the mind-sets of actors on FRM was found to be influenced by their access to resources. FRM sector has access to more resources (e.g. 6-year capital investment programme), and therefore the environmental actors need to take initiatives to capture opportunities for the environment within FRM, rather than it being driven by the FRM sector (LD-03).

Overall, the *actor-based mechanisms* were identified as moderate to strong, as shown in Figure 5-3, requiring adjustment to fully maximise their ability to influence relationships and enable integration. Furthermore, although catchment coordinators were identified both in the EA-environment teams, their connection with the EA-flood risk team was found to be minimal mainly because they are both working on delivering separate programmes of work (LD-04; CB-01). The cross-membership and interaction between the Catchment Partnerships (CP) and the FRM partnerships was found to be different in both study areas. In Yorkshire, one CP host (Aire River Trust) was found to be very effective at linking with the local FRMPs and the RFCC (as an EA appointed member for the environment) enabling the CP to have a stronger voice at the regional level to unlock those environmental benefits through FRM funding. Taking such initiative from the catchment partnership host was found to be welcomed by the EA.

One of our chairs of one of our river's trusts, is trying to bring the environmental outcomes for the FCRM programme up the agenda of the RFCC so he is trying to do that and that's very welcome.
(EA representative Yorkshire LD-04)

However, not every RFCC is as lucky to have someone so willing to enable integration across with environmental objectives. For example, in Cambridgeshire there was no collective voice for CPs regionally and the size of the boundaries of the CPs made it difficult for them to engage across multiple local FRM partnerships (CB-04; CB-17). This lack of regional representation of environment issues was found to be a challenge, especially since the River Basin Liaison Panels (RBLPs) were dismantled after the River Basin Management

Plans were complete (CB-16; LD-03). This decision, due to alleged running costs, was found to be criticised by multiple actors interviewed.

I think a huge mistake from the EA was to shut down the river basin liaison panels. Big error. Their excuse was that it cost too much money. The EA had money then to spend on catchment management, government said oh that's a luxury, you can only spend it on FRM, and so the big money that was around to support WFD catchment activities is lost. (RFCC representative VE-05)

Additionally, it was identified that the CPs were initially not being fully utilised to engage on NFM related interventions and a catchment-based approach. For example, in West Yorkshire after the 2014 floods in Leeds the Aire and Calder Catchment Network (ACCN) was established and funded by Defra (LD-02; LD-03), and in Lincolnshire and Northamptonshire, the Partnership Approach to Catchment Management (PACM) pilot funded by the local-levy through the RFCC (CB-13;CB-05). This indicates a tendency to invest in new partnerships and give less attention to existing ones, which was found to initially cause tensions amongst actors because they were not properly consulted or funded (CB-16; LD-03). Furthermore, the CP hosts were found to be widely recognised as underfunded and felt undermined when Defra announced funding for new 'flood' focused catchment partnerships/networks.

I get £15,000 a year to support our activity. I can't pay for one person out of that can I? Yet they go and set up flood catchment pilots the 4 national flood catchment pilots 50K a year. (Aire and Calder catchment partnership host LD-03)

The NFM designated funding (15£) (*resource-based mechanism*) was found to be a key enabler to kick-start more collaboration across FRM and environment focused NGOs and CP. However, it was identified that its time-limited nature is still a constraint and the standard funding mechanisms for the environment and flood risk (channelled via Defra) are not well enough aligned (N-01; LD-03; LD-04). Additionally, the environmental benefits, named outcome measure 4 (OM4) in Partnership Funding terminology, are not being maximised e.g. the removal of weirs.

It is a real bane of my life that Yorkshire programme. £100m for the next 6 years on 400 odd schemes. When I last looked at it 19 of those had OM4s identified. So, when I see a scheme like removal of culvert, removal of weir, and there are schemes that specifically say that in the programme I think, and they don't have OM4? They don't have Water Framework Directive (WFD) benefits? Excuse me they are explicitly WFD benefits. They are not taking advantage. (Aire and Calder catchment partnership host LD-03)

This indicates the change in attitude towards capturing the environmental benefits as part of regular FRM schemes is needed. One possible reason for this is the time and pressure constraints or lack of capacity among those who are writing the proposals. Therefore, overall

the *resource-based mechanisms* were identified as moderate strength, as shown in Figure 5-3.

Although some *rule-based mechanisms* are in place, it was identified that these are not functioning effectively to incentivise farmers to support NFM implementation and maintenance, thus identified as moderate strength as shown in Figure 5-3. However, the newly proposed Public Money Public Goods, within the proposed changes to the Agricultural Bill (UK Government 2018) offers opportunities to formalise maintenance of NFM by landowners compared to the Common Agricultural Policy (CAP) under EU regulations. This aims to act as an incentive for farmers to manage their land in a more environmentally friendly way and productively use their land. Furthermore, concerns were raised over the liabilities associated with NFM if it does not function as expected, and therefore evidence is needed to provide certainty, as demonstrated in the following quote;

The major drawback with NFM is if it goes wrong – are the farmers liable, this panics and worries them, putting them off. If the EA would provide some assurance that if something goes wrong then the EA will take responsibility. The only way they would do that is if there was enough analysis to say it will work. The other way is that there are safe measures put in place like safeguarding e.g. debris traps (wire traps). (NFU representative N-05)

However, an associated challenge for NFM was to secure funding for lifetime costs and maintenance of the interventions (LD-14; N-05). During participation at the Yorkshire RFCC, a sense of frustration on this topic was rising, combined with associated humour among representatives calling this “*twig repair*” which is a less common form of maintenance to them (LD-14; PO-4). This could indicate the change in attitude and culture needed to support nature-based schemes over concrete schemes, and the associated gaps in *rule-based mechanisms*.

Overall, it was identified that there is positive progress on the development of *joint knowledge*, however, it is mostly at the local scale and has not been used to influence integration at a larger scale, thus is identified as moderate strength, as shown in Figure 5-3. New knowledge has been generated across RMAs, environmental and academic actors e.g. evidence directory on NFM (Environment Agency 2017) supported through the NFM designated funds and local-levy funded studies. However, some gaps still remain to gain knowledge on effectiveness and suitability of the different interventions to influence *rule- and resource-based mechanisms*. For example, the biodiversity benefits of changing the bank profile, opening up floodplains and thus reducing siltation have not been fully quantified although the positive effect is well acknowledged, this is not enough (LD-03).

The funding mechanisms (e.g. Partnership Funding) need clear answers on effectiveness of NFM, but this research is only happening now;

One of the main things under NFM is that it doesn't fit comfortably under the FCERM funding. It's very isolated in its benefits calculations and longevity because the science is there but not for long enough to be tested. That is constantly on our mind. (Aire and Calder catchment partnership host LD-03)

Furthermore, the importance of knowledge exchange between the CP host and RMAs was identified for sharing resources and supporting data collection. This indicates the need for supportive relationships between RMAs (e.g. EA) and CPs to align environmental outcomes.

There are some challenges when it comes down to pulling down some decent data ... I have to rely on my partners. (Catchment partnership representative CB-04).

Overall, the policies were found to be well aligned for *FRM* and *sector-specific policies*, thus moderate to strong integration, as shown in Figure 5-3. The 25-year Environment Plan (YEP) (HM Government 2018) objectives are strongly aligned with FRM, some alignment between regional FRM plans and River Basin Management plans with recognition that the next update can improve (N-11). Additionally, the 25 YEP calls for Natural Capital Plans but has not provided any guidance on how or who would develop these locally (N-09; VE-05). However, the Cambs-Oxford Arc was identified nationally as an opportunity to test out the proposals in the 25-Year Environment Plan.

This is the place we are going to get it right – the real-life manifestation of the 25-year environment plan. (Natural England representative PO-24)

From the agricultural side, the National Farmers Union (NFU) discuss this important role they have in FRM in their 'Floods Manifesto' (NFU 2017), in particular in implementing NFM interventions. Additionally, emerging potential of the Environment Land Management Schemes (ELMS) proposed under the Agricultural Bill offers opportunities for farms to combine multiple uses/synergies for their farm and the environment, thus securing more formalised *rule- and resource-based* mechanisms for adopting and maintaining NFM measures by farmers and landowners. However, overall this disconnect was identified to be a symptom of a lack of connection with national level policies, in particular with Defra – with the power to influence FRM, agriculture and environment sectors.

You know part of the challenge; it would be so much easier to join up at the local level if things were joined up at the national level and in terms of government policy. When you look at NFM and how crucial at how making NFM is going to be, this will be dependent on what replacement of CAP looks like and subsidies for farming. Those two things are entirely an integrated conversation. [...] You know these whole things need a cross government join up. (EA Great Ouse catchment representative CB-01)

Overall, there were significant examples of synergies identified across both FRM and environment/ agricultural specific *interventions*. However, these were found to be on a pilot or project specific basis, therefore are identified as moderate strength, as shown in Figure 5-3. Synergies were identified that can be captured across FRM and environmental interventions, for example, creating a new access to the river to do environmental work which will be created by the FRM scheme, as evidenced in the following quote;

There is a possibility that they [EA] will need to create a new access down to the river that will enable us to do something on that river that we would never be able to do otherwise. (Aire and Calder catchment partnership host LD-03)

In addition, a challenge related to NFM is that it is not technically viable in all catchments, for example those already heavily defended and artificially pumped using NFM goes against the IDBs thinking to clear the banks and increase capacity for the river (CB-05; CB-07). Furthermore, a trade-off was identified between planting trees for NFM to “slow the flow” versus cutting down trees for bankside maintenance if they are at risk of being washed downstream and blocking bridges. Other environmental issues affecting RMAs include managing badgers in and around the watercourse, as they cause problems if they are in a raised embankment (N-05). Regulations, for example, flood risk permitting (*rule-based mechanism*) also need to be followed by RMAs when working in rivers for implementing or maintaining a scheme to ensure biodiversity and water quality impacts are mitigated (LD-03). Additionally, compensation measures were used in flood schemes for example if using weirs, a fish pass can be added (LD-04), or replanting trees that were cut down (LD-04). However, it was identified that sometimes the costs to manage the trade-offs significantly hinder RMAs ability to access funding. For example, for the IDBs to refurbish a pumping station it must be eel compliant, but this adds on ‘a few million’ making the scheme unviable for funding. This is demonstrated in the following quote, indicating the significant resulting negative impact for FRM.

If I refurbish any station within that I must be eel compliant as part of the refurbishment scheme. That adds another few million on top of that. You can move a scheme that was financially viable and would get flood defence Grant in Aid and you can end up with it now not meeting those targets because of the extra costs for eels so then you have scuppered your own scheme haven’t you. (IDB representative CB-05)

Overall, this integration challenge demonstrates progress towards realising integration in practice, and similarly to the first challenge, highlights the current momentum amongst FRM and environment/agricultural actors, both nationally and locally, to achieve integration. However, this momentum is still ‘fresh’ and its ability to sustain is dependent on the adjustment in *actor-, rule-, and resource-based mechanisms*. The implementation of the 25-Year Environment Plan, along with progress on the Agricultural Bill (via change to the Common Agricultural Policy) offers plausible opportunities for change, combined with the upcoming refresh of FRM and RBM plans, emerging new data/science on NFM and the upcoming changes to the 6-year investment programme for FRM. The testing and institutionalisation of such innovative governance mechanisms (e.g. rules, partnerships, funding) to enable NFM in the long term has potential to support other countries with similar integration challenges. This is especially interesting to follow given the struggles associated with adopting and maintaining SuDS (which is further discussed in the following integration challenge). However, despite all this momentum across both sectors, it is still early days for FRM and environmental and agricultural sectors to be working together as partners, in comparison to internal integration within FRM.

5.1.4 Housing and infrastructure growth

The final integration challenge discussed in this chapter is between FRM and housing and infrastructure growth sectors. This was identified as a particularly important challenge in both study areas, in Leeds due to its growth as an economic hub in the North of England (Leeds City Council 2019), and in Cambridgeshire due to the huge expected housing and infrastructure growth due to the Oxford-Cambridge Arc development (MHCLG 2019a). Housing and infrastructure growth is a powerful sector and one which the FRM sector needs to ensure all trade-offs are managed (e.g. increased flood risk). There are benefits for integration between the sectors, for example, the housing sector could gain from increased house sales (e.g. due to additional recreational space through SuDS) or reduced costs (e.g. through better management of drainage), whereas the FRM can capture opportunities to reduce risk over a wider area from the contributions of housing or infrastructure providers.

This is a complex challenge, which could in its own right be split into multiple challenges, however, in this study they are considered jointly. Figure 5-4 demonstrates the profile of integration between FRM and housing and infrastructure growth. This draws particularly on the evidence collected from interactions with the Combined Authorities, Local Enterprise

Partnerships (LEP), highway authorities, Network Rail, Highways England, and Local Planning Authorities through the interviews and participant observation. However, attempts to speak with housing developers, who are recognised as important private sector actors for this integration challenge, were unsuccessful.

This profile demonstrates less progress on building strong *bridging* relationships across sectors compared to the other challenges. Despite some *actor-, rule- and resource-based mechanisms* being in place, these are not functioning effectively to build strong relationships and support the realisation of integration in practice. However, interestingly despite the strong to moderate *knowledge* and *FRM policies* aiming to influence integration, their realisation through *sector-specific policies and interventions* remains weak. This gap suggests the ability of the housing and infrastructure growth sectors to dominate the realisation of integration in practice, despite significant efforts by the FRM sector to influence this change. Therefore, this may indicate that FRM alone cannot enable integration between such sectors and requires embedded change within the housing and infrastructure sectors themselves e.g. adjusting and enforcing sector-specific *rule- and resource-based mechanisms* to better enable integration with FRM. Further insights and evidence into this distinctive pattern are explained within.

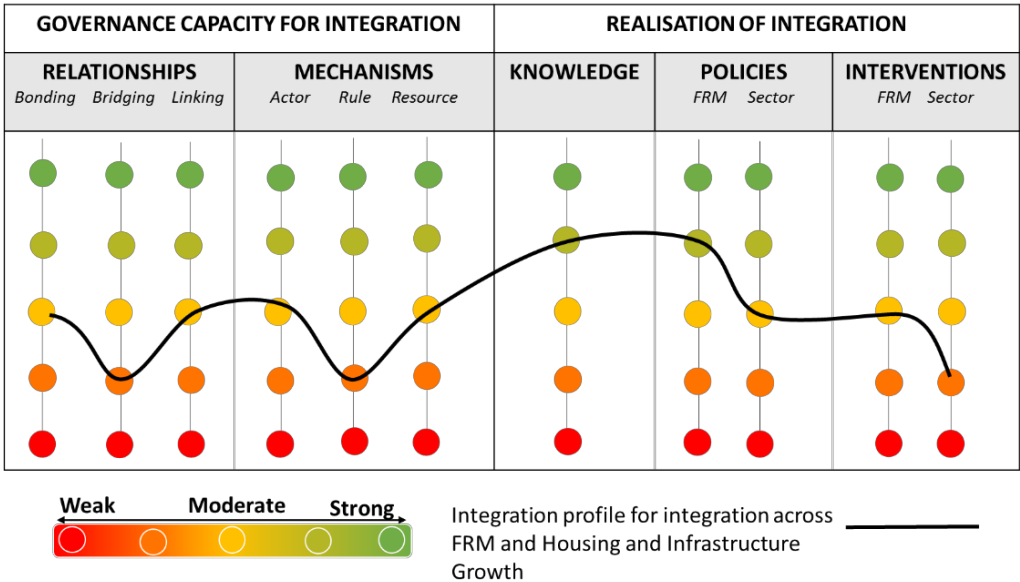


Figure 5-4 Integration between housing growth and infrastructure and FRM

Overall, as shown in Figure 5-4 the *bonding relationships* were identified as being moderate strength, supported through LEPs but scattered with infrastructure providers and developers. Moderate to weak *bridging relationships* were identified between RMAs, and Local

Planning Authorities (LPA), LEPs, infrastructure providers and developers. Overall, there is less willingness to identify the joint opportunities and overcome the associated barriers, as highlighted by an LLFA representative;

There are a lot of barriers, a lot of ‘finger pointing’ for SuDS it will be the house builders saying the Local Authorities are being onerous and don’t know what they want and won’t adopt it and Local Authorities saying that the house builders are cutting corners and not considering it at an early stage, and there probably is an element of truth on both sides. There is no meeting in the middle or willingness. Where you find the best practice is where people are willing to work together but that takes a long time and that’s what it takes for a good case study. (LLFA representative VE-01)

Communication with LPAs is a particular challenge in two-tier councils because there are multiple LPAs and only one LLFA, whereas in unitary or metropolitan councils e.g. Leeds they are both at the same administrative level and thus easier to communicate with. In Leeds, the *bridging relationships* are growing between the West Yorkshire Combined Authority (WYCA) and RMAs with a clear recognition that the effective management of flood risk is of huge importance for economic growth. However, the Cambridge Peterborough Combined Authority and LEP are putting transport infrastructure as the number one priority but are increasingly taking flood risk on board as a result of engagement with the EA (CB-01; PO-25). Furthermore, the willingness is strongly present from the FRM actors to engage with the housing and infrastructure growth sectors, as demonstrated for the EA by the following quote; however, there was a sense that the willingness was not as strong from the sector-specific side.

It certainly has triggered their agenda, and rightly so. I sometimes tease ... [senior EA colleagues] ... that we now rarely refer to FCRM without including economic growth and infrastructure resilience in the same sentence. (Yorkshire RFCC chair LD-07)

Overall, the *actor-, rule- and resource mechanisms* were found to be underdeveloped to support this integration challenge, thus they are identified as moderate, or moderate to weak, as shown in Figure 5-4. Overall partnerships were not as dominant an *actor-based mechanism* than seen in the other challenges, thus negatively influencing the ability for relationships to develop. However, a positive example identified in Leeds is that the flood risk focal point from the WYCA was invited to the West Yorkshire FRM partnership meetings and demonstrated interest and commitment to do so (LD-05). Furthermore, the *actor-based mechanisms* identified to improve the relationship between LLFA and LPA in Cambridgeshire included, co-locating an LLFA staff member in an LPA office, and the LPA inviting LLFA staff members to attend the planning scrutiny meetings, which were both found to be useful to increase communication and mind-set alignment (CB-03).

Additionally, to fill this gap new dedicated roles to interface with planning and development actors emerged to build relationships and enable integration with FRM. For example, in the Anglian region, a strategic growth advisor was jointly funded by the local levy to work closely with LPAs and RMAs to identify opportunities to get flood risk on the growth agenda early in the local plans. However, it was identified that Middle Level Commissioners attempted to establish joint roles directly with the LPAs and failed, due to a lack of funding commitment from the LPA and district councils (CB-07a). One possible reason for this is the lack of prioritisation or recognition of the benefits of such joint working from the LPAs side, again demonstrating the need for FRM actors to ‘push’ from their side to realise integration.

Overall, the *rule-based mechanisms* in particular were found to negatively influence the ability for actors to realise integration in practice mainly because of the poor enforcement of regulations, thus are identified as weak to moderate strength as shown in Figure 5-4. Although there is a strong National Planning Policy Framework (NPPF) in England, updated in 2019 (MHCLG 2019b) that discourages development in the floodplain and has strong requirements on the use of SuDS in developments to manage surface water runoff, challenges with implementing these rules persist (CB-03; CB-09; N-07). Firstly, there are issues with the statutory consultee role on planning applications for surface water whereby the LLFA struggles to communicate effectively with developers, and coordinate responses from all RMAs, as demonstrated in the following quote (February 2018).

X and Y [LLFA staff] have been writing responses, then the IDB have been writing responses and the two were conflicting. This is not ideal for anyone, so to ensure everything runs more efficiently we are starting to work more closely with them and where possible review applications and attend pre-applications meetings together. (Cambridgeshire LLFA representative CB-17)

During an LLFA regional meeting, it was agreed among participants that through better communication and coordination between RMAs, better outcomes with developers could be achieved (PO-19). Additionally, other *rule-based mechanisms* in place to ensure housing developments do not occur in the floodplain (sequential and exception tests) were found to have mixed success and enforcement, as demonstrated in the following quote;

The way they are actually used by many Local Authorities is that they know where they want to put development sites and use the Strategic Flood Risk Assessment to justify that. (EA Great Ouse catchment representative CB-09)

However, another regulatory constraint is the lack of a body to ensure that developers are held accountable for the implementation and maintenance of SuDS features in

developments. Although this was included in the FWMA (schedule 3) it was never enacted due to pressures and conflicting interests on housebuilding targets (i.e. slow down the growth of houses, and negatively affect profit in the housing sector). This demonstrates that the private sector interests can supersede those of FRM. However, some solutions for other RMAs to adopt these SuDS features are emerging, e.g. Sewers for Adoption 8 for water companies (Water UK 2018). Furthermore, conflicting rules from regulators such as OFWAT or other utility providers, were found to hinder integration between FRM and infrastructure planning. This shows how the regulations are not aligned across different government departments to encourage more integration across multiple objectives.

The utilities are the ones that causes the most anxiety as they work under different regulatory frameworks which can't be done on the same cycles as the local plans - so it's more in terms of supply and infrastructure, electricity supply, telecommunications and so on. Those business plans are regulated by the regulators and they are very strict and one of the things we have been trying to do is to get some sort of alignment between strategic planning and utilities planning (Councillor CB-02)

It was identified that *resource-based mechanisms* are available to support integration, both from the sector-specific side (e.g. S106 and Community Infrastructure Levy (CIL) funds from developers, Growth Funding and European Structural Investment (ESIF) funding from LEPs and the Highways England legacy fund) and the FRM side (e.g. Partnership Funding). However, these funding mechanisms are designed in 'silos' with too many 'strings attached' frustrating actors – as illustrated in the following quote;

How you can deliver infrastructure better in the future? Well stop having these siloed pots and the time limiting nature of them, and the strings that causes absolute nightmares. (West Yorkshire Combined Authority representative LD-05)

In addition, the funds gathered to support infrastructure development were found to be limited within the boundaries of the development, constraining where the SuDS features could be put influencing the best use of FRM interventions e.g. storage basins outside the development (CB-02; LD-02). With regards to FRM actors' ability to access funds via the LEP, this had different levels of success in the study areas. In West Yorkshire, the LEP dedicated a special pot of funding called the 'Resilience Fund' of £20m that the EA or LLFA could be bid into for integrated schemes (LD-05; LD-02). By supporting a flood scheme, the LEP aims to unlock growth e.g. protecting some land to build a business park and housing (LD-07). Whereas the Cambridgeshire Peterborough LEP established in 2017 were found to fund joint studies with the EA and are getting more involved in FRM as the developments of the Cambridge Oxford Arc progress (PO-25). However, difficulties were

identified to combine LEP and FRM funds and there is limited knowledge within RMAs on how to capture opportunities because of the different ‘languages’ of the bids, as highlighted by the following quote;

A challenge that we often have is that those putting together bids, say for GiA funding, will write in ‘FCERM speak’. However, if you are trying to get local growth deal money [through the LEP] or European money [through the ESIF committee] then you need to speak in their ‘language’ and address their priorities and objectives. (Yorkshire RFCC chair LD-07)

Additionally, the Partnership Funding calculator makes it difficult to value the benefits of infrastructure, which was raised in many of the meetings attended (PO-25; PO-03; PO-07). However, the ability of FRM to unlock economic growth objectives offers greater potential to access economic growth funding such as that from the LEPs. Furthermore, from the LEP’s point of view they were found to struggle to get around the ‘strings attached’ to different funding pots for infrastructure projects, for example the timelines for delivery, as highlighted in the following quote;

There have been various consultations from government reviews and panels where we’ve said look give us the cash with fewer strings attached and we’ll commit to delivering XYZ but we’ll do it over whatever timeline, it would be better if we have that pipeline of integrated schemes, it would give us a bit more teeth to that discussion. (West Yorkshire Combined Authority representative LD-05)

The national targets on housebuilding were found to dominate their ability to support integration with FRM. The MHCLG set the target for LPAs to develop 300,000 net additional homes a year on average, putting the LPAs under pressure to develop housing quickly, often in floodplains and thus, contradicting Defra’s target to have 300,000 homes better protected (VE-05). This indicates the lack of cross-department priority setting at the national level, and the potential power of the profit-orientated housing sector.

Overall, it was identified that there is generally sufficient *knowledge* (e.g. studies, guidance) to justify integration across sectors, however, this is not always being used sufficiently, or used in an unintended way to influence policies and interventions (CB-09). The Strategic Flood Risk Assessments (SFRAs) form the FRM evidence base for the local plan and are typically outsourced by the LPA to consultants and generally do not involve the LLFA or other necessary RMAs upfront (N-01). The degree of involvement of RMAs in the local plan development process (i.e. when new development sites are allocated) was identified as being too late to really influence where the development happens causing frustration. The LLFA can suggest conditions for the developer (e.g. the quality/type of SuDS feature) but the power is in the LPAs hands to accept advice or not. However, some interviewees felt

that there is limited knowledge and/or skills of sector-specific actors and this influenced their ability to incorporate flood risk e.g. LPAs (N-06; N-01). Anglian Water have a SuDS adoption guide and if followed then SuDS could be adopted, and they have a guidance document for the inclusion of SuDS in the local plan. The LLFAs and Anglian Water were identified as having guidance documents on SuDS for developers and LPAs to use, as demonstrated in the following quote. However, the extent to which these processes included sector-specific actors was limited, thus demonstrating the challenges to engage with those actors.

The county council prepared a supplementary planning document with our district councils so that we all have the same planning policy for flood risk. That is something we are really proud of and it's gone really well. We learnt a lot in the process of working together on that. (Cambridgeshire LLFA representative CB-17)

In addition, the maintenance of SuDS also requires new knowledge. For example, in Leeds permeable paving cannot be gritted using normal rock salt because it blocks up the drainage channels, therefore the highways authorities changed to marine salt, thus indicating the need to adapt their regular practices (LD-09). Subsequently, the knowledge on SuDS has developed over years and is now quite substantial (compared to the research/knowledge on NFM) yet still does not have widespread implementation. This may indicate that knowledge is not the fundamental barrier to realising integration in FRM for this integration challenge, or that rules are driven by other dominating factors, such as the private sector having more influence. For these reasons, knowledge is assessed as having moderate to strong integration, as shown in Figure 5-4.

Overall, the *FRM plans* were identified as strongly recognising the need for alignment with housing and infrastructure growth. However, the *sector-specific plans* were much more difficult to influence, thus *FRM plans* are moderate to strong and sector plans are moderate strength, as shown in Figure 5-4. Some new joint plans were identified e.g. Network Rail Weather Resilience and Climate Change Adaptation plan (Network Rail 2017). A strong need for such regional spatial strategies, such as the planned Cambridgeshire-Peterborough (non)-statutory Spatial Plan, was strongly advocated by actors to align local (development) plans, strategic economic plans/ industrial strategies and regional utility plans (e.g. Drainage and Wastewater Management Plans, Water Resources Management Plans) with FRM plans (N-09, CB-17, CB-02). These misaligned planning timelines and associated funding was found to cause frustration among actors, resulting in duplication and inefficiencies during implementation, as illustrated by the following quote;

I don't know how much it matters, I think it does because there is duplication of efforts, it causes frustration and it would be nice if we could have similar or identical planning could be ideal. I'm not sure what actual practical problems it creates on the ground but it's a waste of resources and it duplicates resources, I think. (West Yorkshire Combined Authority representative LD-05)

Such a regional approach could allow early planning of infrastructure works that may be needed in the future for large developments e.g. sewerage treatment works, broadband, and road infrastructure (LD-05). Both the West Yorkshire and Cambridgeshire-Peterborough Combined Authorities were found to be conducting opportunity mapping together with the EA to identify potential synergies across objectives and set out potential integrated schemes ready to propose when opportunities arise. Interestingly, the Strategic Economic Plan (under the LEP) made a commitment to Leeds Flood Alleviation Scheme by taking a catchment approach and not following the West Yorkshire or Leeds City Region boundaries which it would normally (LD-05). This demonstrates the need to be flexible with planning boundaries to enable integration, but also to recognise that these are underlying challenges where there are no easy solutions, as evidenced in the following quote;

There is a geography mismatch but West Yorkshire and Leeds City Region and catchment areas and we are trying to move to a catchment approach, but these don't fit any administrative area so we're really struggling with that. We know it's an issue but at the moment it's kind of a blank page in terms of what we can do to resolve it. (West Yorkshire Combined Authority representative LD-05)

Overall, the *FRM interventions* were found to account for interactions with *sector-specific interventions*, however, the *sector-specific interventions* (e.g. housing developments, transport project) were only identified to do so on a project-by-project basis, thus are identified as moderate to weak as shown in Figure 5-4. SuDS were found to be implemented in some housing developments but not at a large scale and their long-term effectiveness was found to be dependent on the maintenance arrangements in place (CB-12; CB-15; LD-02). Flood schemes were recognised as unlocking economic benefits e.g. jobs and investment in Leeds, whereby there is a general shift towards 'place making' in the urban areas to design places that are sustainable, resilient and inclusive that deliver multiple benefits (LD-02; LD11). In Leeds City Council the FRM team sits within the economic development group which helped them to integrate the objectives and get approval for integrated schemes, thus "*are rarely setting schemes up in isolation*" (LD-02). For example, the WYCA investment of £2.6 million into the Wyke Beck Valley flood alleviation scheme will fund the creation of new embankments and flood storage areas to reduce the risk of flooding to 60 homes (FRM objective). Additionally, it will make possible the development of 200 homes by 2025 on brownfield sites in East Leeds (development objective) and create green space and a

local reserve nature park (environment objective) (LD-02) – thus creating synergies with other sector objectives. Furthermore, the scheme received £1m funding from the developers and therefore did not require Grant-in-Aid funding. Additionally, the ability to stagger project delivery phases to more easily align the funding timescales from different partners and deliver specific objectives was identified to influence actors' ability to enable integration, as highlighted by an LLFA representative;

If you have the good relationships, the main barrier with working across boundaries is the alignment of when you want to do projects and when you have your funding. It is the timing of when you can and when you can't do it. If you have a local authority that has other priorities on their capital side for the next two years but they can do it in year 3 – you have money now that you need to spend and the EA might not be able to do anything on their programme for the next 5 years. Anglian Water have to wait until the start of the next Asset Management Plan period. You can make it a 5-year project instead of a two-year project and get the bits done at a time. But that involves someone coordinating somebody else's risk and someone that is willing to look on the long term. (LLFA representative VE-02)

Within *sector-specific interventions*, synergies and trade-offs for FRM were found to be considered on a project-by-project basis, involving a lot of joint learning through the process (CB-09; N-06). For example, the LLFA, EA and IDBs were found to work together to influence Highways England on the A14 Cambridgeshire to Huntingdon improvement project demonstrating the need to work together early on in the planning process to identify potential synergies and manage trade-offs. For example, one conflict identified is that Highways England want river crossings that have a short bridge span to save costs, but the EA want a long span to give more room to the river (CB-01; CB-02). The EA sees it as their role to increase their awareness of such trade-offs and to look for opportunities to reduce risk, as illustrated in the following example in the Great Ouse catchment;

7 major river crossings, across one of the most flood sensitive parts of our catchment – couldn't have picked a worse spot – might as well have drawn a line across our most vulnerable part of the catchment. It's how do we make sure that those plans don't increase flood risk to people and then it's how we can inform them to be beneficial and improve things alongside environmental improvements and all the other stuff. (EA Great Ouse catchment representative CB-01)

Synergies were then captured in later phases of the project, through the Highways England Legacy Fund which funded PLR schemes for households along the route and SuDS schemes which would not have been funded otherwise, as mentioned in the RFCC meeting, PO-2 (Environment Agency 2018). Furthermore, the knowledge created through jointly learning about integration through project implementation directly, as demonstrated in the following quote for the A14 road improvement project, can then be applied to the next project.

It's been an up and down journey and we learned quite a lot and will get some good environmental outcomes and then you've got learning that you apply to the next major infrastructure project which might be with Highways England or network rail. (EA Great Ouse catchment representative CB-09)

Overall, this *integration challenge* demonstrates that the potential for synergies both for FRM and housing and infrastructure growth are large, but the *actor-, rule- and resource mechanisms* in place currently do not facilitate smooth integration between the two sectors. However, in light of the gaps, positive progress is still being made where more efforts and opportunities are in place to build those stronger relationships (e.g. West Yorkshire LEP, Cambridgeshire-Oxford Arc). Furthermore, when there are individuals willing to engage (e.g. strategic growth advisors, LLFA flood risk managers) then it is possible, but is expected to take time to build relationships. Despite the knowledge being available, there is a lack of sufficient regulatory power from the FRM sector to influence powerful (often profit-orientated) actors e.g. developers, house builders. Therefore, a more fundamental shift is required from national government to better enforce climate resilient housing and infrastructure growth (through *rule-based mechanisms*), as there is only so much the FRM sector can achieve alone, for example through advocating it in their new (draft) strategy (Environment Agency 2019b). However, national level progress is on the horizon, considering the mandated Biodiversity Net Gain (Defra 2019b) with potential to expand to include flood risk net gain in the future, yet such a shift is expected to take time.

The above presented assessments of the four integration challenges identified for FRM in England is very dense in evidence collected on FRM in England and rich in patterns that can be further explored. To do so, the following two subsections demonstrate the interconnectivity between the key elements of integration and key barriers and enablers for realising integration in FRM, as identified across the profiles.

5.2 Critical interactions between elements of integration

Within this section, the critical interactions identified between the elements and the resulting influence on integration in FRM across the integration profiles are discussed. An overview of these connections, numbered 1 to 5 are illustrated in Figure 5-5, and presented in this order herein. Furthermore, links are drawn to the relevant literature that further supports these findings.

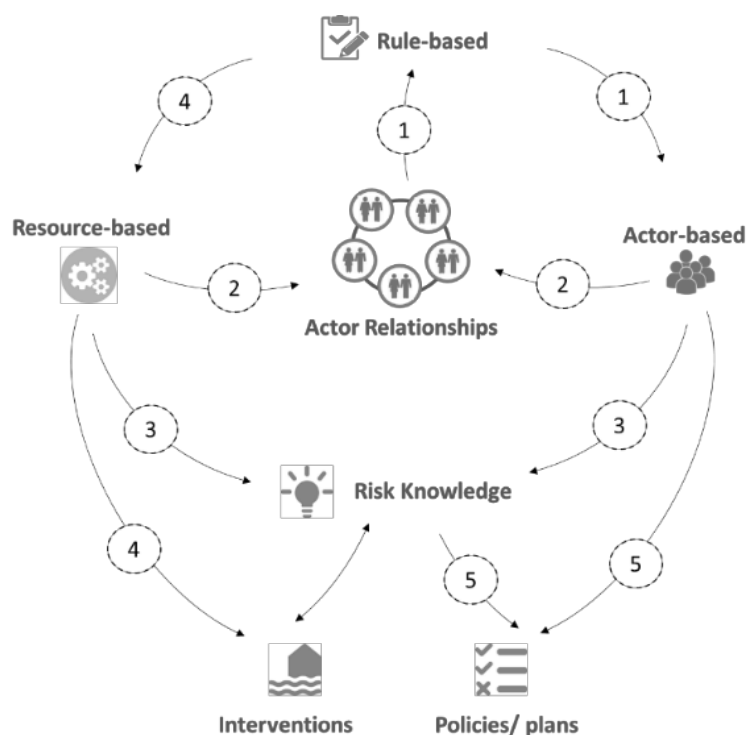


Figure 5-5 Interaction between key elements of integration

5.2.1 Interaction between rule-based mechanisms, actor-based mechanisms and actor relationships

An interesting pattern identified across the integration profiles presented in Section 5.1 is how the changes to *rule-based mechanisms* initiated significant progress to *actor-based mechanisms*, which in turn successfully strengthened *actor relationships* – as shown by number 1 in Figure 5-5. However, the extent to which this was effective was found to vary for different integration challenges and is explained further herein. A positive example identified is within FRM where the changes to the FWMA (2010) were found to initiate strong local FRM partnerships and strengthened the role of the RFCC, which strongly improved the strength of the relationships between RMAs, as depicted in Figure 5-6.

Although, this was clearly evident in the study areas, on many occasions at meetings, actors explained that in places where the partnerships were not in place, or as well structured, that the relationships were not as strong between RMAs (PO-1; PO-18). Additionally, other examples were identified where actors went beyond their statutory requirements under the FWMA. For example, the National Flood and Coastal Erosion Risk Management Strategy (planned update in 2020) was observed as having an intensive multi-stakeholder consultation (150 individuals across 90 organisations) in different working groups before the official required public consultation. Such an approach supports many researchers' plea to mainstream such open and diverse engagement processes (Innes and Booher 1999, Newig and Fritsch 2009).

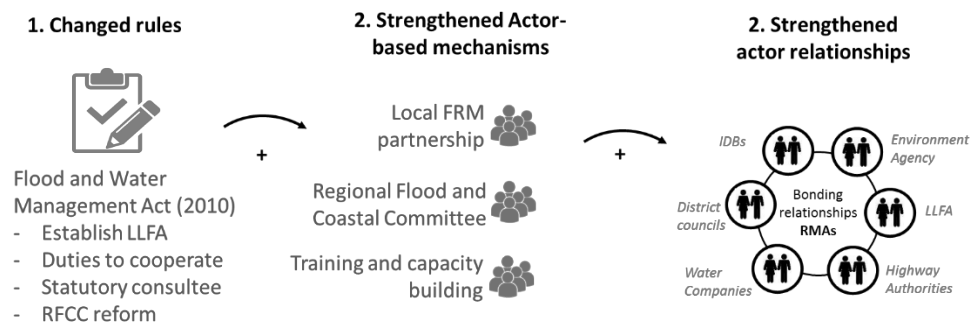


Figure 5-6 Interaction between rules, actor-based mechanism and actor-relationships with FRM

Similarly, for the integration challenge between FRM and the environment, the WFD led to the establishment of *actor-based mechanisms* e.g. catchment partnerships (CPs) at catchment level and the River Basin Liaison Panels (RBLPs) at the regional level, which in turn strengthened *actor relationships*. However, once the planning cycle was completed the RBLPs were disbanded and in some areas new FRM focused CPs emerged as a result of post-event funding e.g. Aire and Calder Catchment Network. Furthermore, this indicates that the initial design of the *rules* and resulting *actor-based mechanisms* failed to sufficiently develop *bridging relationships* in a continuous way. In comparison, the integration challenge between FRM and emergency management, the rules under the Civil Contingencies Act were designed to strengthen relationships between Category 1 and 2 responders and did so effectively through the LRF. However, it did not recognise the wider potential roles of other organisations or different actors within category 1 and 2 responding organisations, across the breadth of RMAs e.g. IDBs, LLFAs. Therefore, opportunities are missed for building relationships and enabling integration in FRM.

For integration between growth and infrastructure, there is a mixture of relevant legislation e.g. Highways Act, Planning Policy but these were not found to be driving *actor-based mechanisms*, and thus failed to strengthen *bridging relationships* with RMAs. Although there are specific rules on cooperation, e.g. statutory consultee role, these are not matched with high communication intensity, leaving FRM actors to develop their own *actor-based mechanisms* to fill the gap e.g. attending planning authority meetings, sitting in LPA office, dedicated staff. Additionally, the FRM sector needs to directly push and influence any existing sector-specific actor-based mechanisms (e.g. involvement in the LEP and combined authorities) to build those *bridging relationships*. The limited progress for this integration challenge, demonstrates how important it is to combine *rule- and actor-based mechanisms* to build *bridging relationships*.

Overall, these findings suggest that the design of rules can initially limit the inclusion of actors and need adjustment of *actor-based mechanisms* (e.g. inviting broader actors, to effectively build actor relationships) to compensate and strengthen the relevant actor relationships. This also shows how some sectors more naturally enforce collaboration in their legislation e.g. FWMA, CCA and WFD, in comparison to the growth and infrastructure sector, potentially due to their private sector interests. This suggests that more rules may be needed in such sectors to facilitate the process of strengthening relationships to enable integration. These findings support others on the need to ensure consistency between sets of mechanisms to enable integration (Gunningham and Sinclair 1999, Stead and Meijers 2009, Candel and Biesbroek 2016).

5.2.2 Interaction between resource-based mechanisms, actor-based mechanisms and actor relationships

The next interaction identified across the integration challenges is the connection between *resource- and actor-based mechanisms* and the influence they jointly have on *actor relationship strength*, as highlighted by number 2 in Figure 5-5. This was found to have different effects across the different integration challenges. For example, there was time-limited national funding allocated to support training and capacity building (*actor-based mechanism*) for the establishment of LLFAs to help RMAs understand their new duties. The initial progress was found to be highly linked to the capacity and skills of the newly formed LLFAs to engage effectively with other RMAs. Interestingly, the role of the LLFA has since broadened, recognising the need to integrate flood risk across multiple sectors and engage

with a much broader group of actors and associated partnerships e.g. with LEPs, CPs and LRFs. Therefore, the skills they require have adapted e.g. preparing proposals/bids for Partnership Funding or overcoming the associated ‘strings’ attached to sector-specific funds. This suggests that continuous funding for training and capacity building is needed and that adapts to the changing needs and requirements of the RMAs (outside the original legislation) and increases their ability to capture opportunities for integration in FRM.

It is and it needs resources [knowledge exchange and training]. After the FWMA came into effect, there was quite a lot of funding from Defra and the Environment Agency on skills improvement but that hasn’t been renewed as far as I can tell. (CIRIA representative VE-07)

However, the findings show how RMAs responded to this need for funding *actor-based mechanisms* by utilising other sources of funding, especially the local levy fund (e.g. to fund staff) or relying on in-kind resources (e.g. free office space for meetings, running extra meetings, sharing low-cost trainings). Similarly, for integration between FRM and the environment sector (see Section 5.1.3), Defra’s decision to fund new CPs focusing on flooding instead of widening the remit and impact of existing CPs was a missed opportunity to strengthen *bridging relationships*. This could indicate the tendency for government to forget about their previous funding support for *actor-based mechanisms* when under pressure after flood events to make commitments to ‘something new’. In comparison, neither the LRF nor the LEP received dedicated funding for training and capacity building with wider actors, limiting their ability to build strong *bridging relationships* with RMAs. Figure 5-7 attempts to depict this gap. After regulations are put in place, *actor-based mechanism* funding begins to decrease. Actor relationships increase with time to begin with, but funding needs to continue to sustain them.

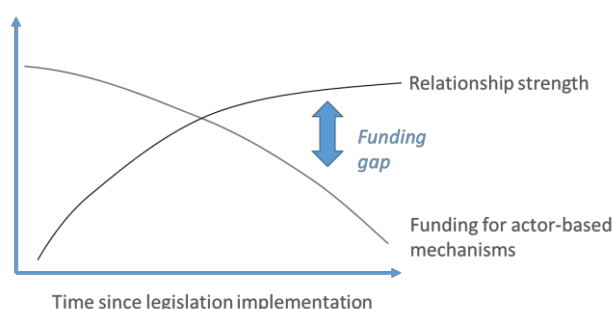


Figure 5-7 Relationship between funding actor-based mechanisms and time since policy implementation

Additionally, an interesting example was identified nationally where government funding was cut for an infrastructure operators’ forum, making the members feel less inclined to

participate because it was not formally supported by government. This demonstrates the important role for government to facilitate such relationship building in the long-term, and also suggests the importance of doing so at the national level – as demonstrated below;

One thing they [infrastructure operators] commented is that the funding has been cut [for the Infrastructure Operators Adaptation Forum]. They felt that by cutting the fund, the government was somehow making it less relevant, it was less drawing for people to come to a Forum that didn't seem well supported by government. The convening power of government and the official nature of it is important. (National Infrastructure Commission representative VE-02b)

Vangen and Huxham (2003 p. 21) identify that when government funding for partnerships comes to an end “*new government initiatives begin to encroach on existing partnerships' territories*” leading to a change in direction and/or membership. Although, this does not align directly to the case as presented here, it does demonstrate the dependency between government funding and partnership longevity.

Overall, this interaction between elements indicates the continuous funding requirement for *actor-based mechanisms* to enable integration to strengthen necessary relationships. Allowing such capacity to deteriorate, runs the risk of causing actors being unable to build relationships across sectors because of their skills and capacity, thus negatively influencing integration in FRM. Furthermore, it limits the opportunities to continuously exchange *knowledge* as approaches to enable integration change over time. In addition, investing in building strong relationships can help actors to pinpoint the legislative gaps yet still motivate them to be creative with existing mechanisms and enable integration. The need for funding such early engagement, and continuous learning and exchange between actors for FRM is recognised by other authors (Mcfadden et al. 2009, Challies et al. 2016).

5.2.3 Interaction between actor-based mechanisms, resource-based mechanisms and knowledge

The next interaction identified is between *actor and resource-based mechanisms* and their influence on generating *integrated knowledge*, as highlighted by number 3 in Figure 5-5. A clear pattern was identified within FRM whereby significant joint funds i.e. local levy were being invested into developing studies and investigations, to form the baseline evidence to use for FRM planning and interventions. The availability of the local levy fund meant that this could be completed in a joint way across the region and knowledge could be easily shared by actors, or it offered a portion of the funds that could then be co-funded by other RMAs e.g. water companies, EA. Similarly, specific designated funds e.g. for NFM or from

Highways England for their legacy fund, offered actors significant opportunities to develop knowledge jointly and build the evidence base needed to justify the implementation of interventions and acts as ‘small wins’ (Vermaak 2013, Termeer and Dewulf 2019) for integration in FRM practice. The *actor-based mechanisms* acted as a useful means to debate the spending of these funds and bring along a wide range of actors in the process of developing the knowledge.

In comparison, for other integration challenges (e.g. emergency management and FRM) the lack of a joint fund led to a knowledge gap having a knock-on effect on actors’ ability to collaborate both with partners and communities, to conduct studies to investigate better interventions e.g. location of temporary barriers. Whereas, for housing and infrastructure growth the willingness to develop integrated knowledge was funded from the FRM side (for example SuDS guidance) and it was more difficult to involve actors such as developers and LPAs in the process. Furthermore, despite the body of knowledge created on SuDS (mainly by RMAs, universities) it has not managed to fully influence changes to *resource and rule-based mechanisms*. This may suggest that it is not just the technical knowledge (on effectiveness of measures) that is limiting integration, but the knowledge on governance/legal studies to really define new governance arrangements (e.g. through CAP). However, a body of knowledge now being created for implementing NFM, although mostly funded directly from the national level, is being completed more closely with farmers and landowners (i.e. those who are expected to implement the interventions). Again, this demonstrates the importance of strong *actor-based mechanisms* to develop and fund joint knowledge generation, as identified by Evers et al. (2012).

5.2.4 Interaction between resource-based mechanisms and interventions

Another interaction identified across the integration challenges is the connection between FRM and sector-specific *resource-based mechanisms* and the realisation of integration through FRM and sector-specific *interventions* - as shown by number 4 in Figure 5-5. Considering funds, such as the NFM designated fund (a once off allocation), this proved very beneficial for progressing NFM pilots at a local level, however, the ability of RMAs to recognise and capture environmental benefits in flood schemes (under the capital investment programme) was found to be low. This is possibly due to the relative limited importance of the environment sector (in terms of funding) when compared to FRM in the 6-year investment programme. Therefore, this implies that the scale of application of the

NFM interventions will remain small and short-lived, unless the FRM and environment funding mechanisms (through Defra) are adapted to facilitate such integration at scale. Interestingly FRM acts in both positions of higher and lower power or ability to influence other sectors, when considering the funding. For example, large infrastructure projects exceed in millions the FRM funds, thus can be seen as a more powerful sector (PO-24) whereas funding for the environment sector is much less than FRM. This also requires a shift in mind-set from FRM actors to be proactive to seek intervention opportunities in areas of lower priority for FRM but high priority for growth or other sector objectives. The following quote from the Environment Agency captures this well;

Where is the inward investment coming? For the best will in the world it's not going to be around some fish passage improvements. It will be around if the growth and infrastructure and 0.5 million new homes come in and all that is needed to accompany that. So how do we all embrace that and go as a collective voice for the environment either for flooding or for fish or for whatever it is, and we get the best deal possible. That might not draw us to places that are highest priority for flooding, but it will create some momentum and you're exploiting the funding. (EA representative Great Ouse catchment CB-01)

The quote highlights how actors within the FRM sector need to step outside their normal FRM priority areas and look towards investments in other sectors to capture those opportunities for both FRM and other objectives, like the environment, to realise them on a larger scale. This suggests that the nature of these sector-specific *resource-based mechanisms* will always require some modification to align them with FRM and are harder to influence in comparison to FRM *resource-based mechanisms*, or at least those within the same government department (e.g. Defra). Furthermore, this indicates that FRM actors (e.g. flood risk managers) and sector-specific actors (e.g. catchment partnership hosts, combined authorities) need to be creative with these funding sources to find ways to get around their associated funding 'strings' to implement interventions. This connects back to the first point made in Section 5.2.1 about capacity building and is further discussed in Chapter 7.

5.2.5 Interaction between plans, actor-based mechanisms and knowledge

A pattern identified across the integration challenges is the ability of both FRM and sector-specific plans (and associated planning processes) to influence the development of *actors' relationships* both positively and negatively, and their ability to do so being dependant on the availability and quality of *actor-based mechanisms* - as highlighted by number 5 in Figure 5-5. The availability of partnerships facilitated actors' engagement in the planning and monitoring process, for example for the Local FRM strategies within the local FRM

partnerships and the medium-term plan within the RFCCs, and the Multi-agency flood plans through the LRFs. Furthermore, the relationships built during the process were found to support the plan implementation, monitoring and review processes. However, *actor-based mechanisms* are required to capture the *knowledge* gained through these engagement processes and used for future updates, as identified by other researchers (Evers et al. 2012, Cassel and Hinsberger 2017).

However, in comparison, the *sector-specific plans* in the absence of partnerships, individual staff members are relied on to ensure alignment e.g. the strategic growth advisor for the local development plans. Especially, considering the density of plans across sectors, their jagged timelines and funding allocations, the *actor-based mechanisms* offer a means to enable early communication and engagement with separate planning processes, as advocated by other researchers (Stead and Meijers 2009). As identified for Anglian Water, dedicated staff helped to pinpoint opportunities across their Asset Management Plans and FRM. However, planning processes can also de-motivate actors if there is no real purpose of the plan or if it feels like it is a repetition of something already complete - “*plans for plans sake is what becomes frustrating, I think.*” (CB-09), as identified when the Regional FRM plans quickly followed after the Catchment Flood Management plans. This suggests that planning can also have a negative effect on building relationships, and perhaps undermining the role of *actor-based mechanisms*.

Overall, this section highlighted the interactions and dependencies between different key elements of integration and their associated indicators. The next section builds on the identification of the patterns to further explore the more dominant enablers and barriers for realising integration in FRM.

5.3 Identifying enablers and overcoming barriers to integration in flood risk management

Despite the progress on enabling integration across the different challenges, many barriers were identified that hindered the progression of integration. This section discusses these enablers and barriers, looking comparatively across the identified integration profiles. The indicators within the framework are drawn upon to demonstrate the most critical factors as follows:

- Building linking relationships;
- Partnership membership interconnectivity and scale;
- Coordination and engagement staff;
- Design of funding mechanisms;
- Clarity and functionality of rules;
- Availability of flexible ‘opportunity/pipeline’ list.

Building linking relationships

The findings demonstrated across each of the integration challenges that building strong linking relationships with the community is a particularly hard area to address, as identified by other scholars working on FRM in England (Forrest et al. 2017, Mehring et al. 2018). As identified from the evidence collected from FRM professionals, further community engagement can help increase knowledge on flooding and instigate public behavioural change, for example for riparian owners maintaining their watercourses or affected populations not requesting sandbags during flood events, causing frustration among authorities. Despite the establishment of flood action groups in many flood prone areas across England, a gap remains in linking them with the formal decision-making processes, as similarly found by Benson et al. (2016). However, successful examples in other parts of the country were identified e.g. Cumbria (Deeming 2016). Furthermore, dedicated staff are needed for engaging with the public and utilising their knowledge through more neutral facilitation, as identified by Mehring et al. (2018). Therefore, *resource-based mechanisms* are needed to engage communities across multiple integration challenges e.g. emergency management, catchment management and planning. Additional research directly with communities could further develop these findings.

Partnerships membership, inter-connectivity and scale

Overall, the presence of partnerships (*actor-based mechanism*) in England for FRM and other sectors is high, as strongly advocated in practice (Newig and Fritsch 2009, van Herk et al. 2011). However, steps can be taken to improve their effectiveness and to maximise their ability to influence the realisation of integration through *knowledge, policies* and *interventions*. This is an interesting finding in England, because there has been such huge progress on partnership working, however, the challenges and lessons from the practical implementation of such institutionalised partnerships is less documented and understood, thus offering good lessons for other areas with less partnerships in place.

A common pattern identified across multiple integration challenges is the need for stronger inter-connectivity between FRM and sector driven partnerships (e.g. RFCCs, LEPs, CPs and LRFs). This includes stronger participation of community representatives and sector specific representatives in FRM partnerships e.g. RFCC, while FRM representatives on sector-specific partnerships (e.g. LEP, LRF and CP). Similar findings were also identified by researchers on FRM in England (Benson et al. 2016, Maiden et al. 2017). Additionally, the presence of such partnerships is needed both at the local and regional (including wider catchment) scales so that they can feed into one another more easily. For example, the CP and flood action groups typically do not have regional representation making it hard for them to develop a regional voice to engage in regional/ wider catchment FRM partnerships (i.e. RFCCs). Additionally, the mismatch of boundaries makes it difficult to interlink partnerships, the LEPs working on economic boundaries, the LRFs on police boundaries and LLFAs (and associated FRM partnerships) on administrative boundaries. This demonstrates the additional need for connecting these adjoining partnerships because in most cases they do not fit the catchment boundaries (from an FRM perspective) or the boundaries where sector-specific interventions are planned. For example, the Cambs-Ox Arc cuts across 30 LLFAs, 3 LEPs, and 3 RFCCs across the Thames, Nene and Great Ouse catchments demanding cross linkage for delivery. More broadly, literature on collaborative partnerships recognises the influence of partnership structure and membership, along with links between partnerships on actors' ability to generate joint outputs or 'collaborative advantage' (Huxham and Vangen 2000a). Furthermore, it was identified that the use of existing partnerships should be maximised and invested in instead of developing new ones, as was seen with the Aire and Calder Catchment Network, so they can support generating knowledge, aligning policies and interventions. Although, it was not the focus of this

research, the need for more cross-government national partnerships did emerge, especially to set direction on an integrated approach (e.g. for such large infrastructure projects) and to jointly develop mechanisms. These findings support other literature on partnerships, ensuring breadth of membership for different actors (Djalante 2012, Benson et al. 2016) and having different partnerships at different spatial levels (Thaler et al. 2017, Otto et al. 2019).

Coordination and engagement staff

Another common pattern identified across integration challenges, is the need for resources for dedicated staff that take on the role of coordination across partners, and to develop their skills – both within FRM and across sectors. For example, having a dedicated funded role, such as FRM partnership managers in water companies, community engagement staff and strategic growth advisors connecting FRM to the LEP and LPAs. Additionally, having more staff within the specific sectors to drive joint efforts with FRM, such as the Combined Authority having additional roles/or partial roles to facilitate engagement in RFCCs, local partnerships. This need for investment in staff and capacity building was also documented in an EA report on NFM implementation (Environment Agency, 2019b). Furthermore, the current *resource-based mechanisms* can enable integration across interventions but are heavily dependent on an individuals' ability to be creative with these associated 'strings' to capture synergies. Therefore, additional knowledge sharing and capacity building is needed across RMAs to build the skills and competencies of staff to be able to tap into these funding sources. The different roles that individuals play to work around the 'strings' associated with regulations and funding streams is further explored in Chapter 7, in line with Williams (2011).

Design of funding mechanisms

Similarly, to the progress on partnerships, a huge leap was taken with the implementation of joint funding (i.e. Partnership Funding and local levy) to enable integration, but still some gaps exist to align the evaluation criteria, timelines and timescales of *resource-based mechanisms* – as also identified by Alexander et al. (2015). The funding criteria do not sufficiently recognise the benefits for other sectors (e.g. business, infrastructure, environment) and favour interventions to manage main river flood risk over surface water flood risk, as supported by Thaler and Priest (2014). Furthermore, sector-specific driven constraints were found to limit the ability for actors to utilise these e.g. OFWAT regulations. Therefore, acting as a limited incentive for them to contribute, as also identified within

recent Defra commissioned studies on Partnership Funding (Clarke et al. 2018). In addition, the time limited nature of some funding streams (e.g. Pathfinder, NFM designated funds, FWMA implementation funds) hinders integration in the long term, especially in relation to capacity building and strengthening actor relationships, if funding is not embedded in existing/mainstream funding streams. Therefore, it can be argued that although this new way of thinking, and associated joint funding is advocated for by the FRM community, it has not yet infiltrated to the sector domains. This could indicate that the value of partnership working is not yet recognised by national level actors who have yet to change their own funding mechanisms, even within Defra. This supports the idea that the situating ministries (or departments) ‘under the same roof’ is not enough to enable integration (Russel and Jordan 2009). Furthermore, other priorities are likely to prevail for sector-specific actors who are likely to be less interested to engage with FRM actors. However, a heightened level of urgency, such as a flood event (Johnson et al. 2005) or visibility of risk (e.g. coastal area) can increase their interest, as seen through the LEPs involvement in FRM in Leeds and Lincolnshire. This demonstrates the incremental nature of integration and how integration may need to happen (or be ‘pushed’ for) within one sector to build momentum across other sectors. This finding supports literature on the dynamics of policy change (Schout and Jordan 2005, Arts et al. 2006).

Clarity and functionality of rules

Similarly, across all integration challenges, the *rule-based mechanisms* positively influenced integration but needed some adjustments, in particular around clarifying roles and responsibilities of actors. This is a realistic finding, as it is unlikely that initially designed legislation is ‘perfect’ and further adaptations or amendments to legislation is expected based on learning from practice. To give an example, the FWMA did not cover surface water flooding well because there was less knowledge on this nationally and additionally the EA were strongly focused on the delivery of ‘300,000 homes better protected’, most of which were main river schemes. However, now surface water has crept up the priority ladder and is gaining more attention nationally, for example as demonstrated through the national surface water action plan (Defra 2018). Furthermore, the gap in legislation is a symptom of a lack of cross-departmental collaboration at the national level. For example, the emergency management sector (Cabinet Office), FRM/ environment actors (Defra) and local government (MHCLG) need to collaborate on how to build community awareness and preparedness on flooding but currently this role is scattered

across sectors. Furthermore, the Department of Transport needs to collaborate with Defra to implement the new FCERM Strategy if it can deliver the desired ‘climate resilient infrastructure’ (Environment Agency 2019b), but have not been actively engaged during the consultation process. It is expected that this national level collaboration needs to strengthen before the FRM sector can influence their regulations. Furthermore, integration challenges like NFM require new *rule-based mechanisms* to enable maintenance by farmers, landowners or NGOs, although the proposed Agricultural Bill offers opportunities for positive change (Bateman and Balmford 2018). However, unfortunately the challenge of maintenance, is somewhat similar to that for SuDS interventions which were found to still prevail.

Availability of a flexible ‘opportunity/ pipeline’ list

The importance of having a ‘pipeline’ of integrated plans or schemes that demonstrate multiple benefits, which can be used when funding opportunities arise was highlighted across the different sectors. FRM and sector-specific plans are likely to always struggle to systematically align interventions because of inherent jagged timelines and funding allocations, therefore it is more important to have a workable document that recognises the potential areas/opportunities from both plans and that the actors agree to work towards realising such opportunities early-on/upfront, as also identified by Stead and Meijers (2009). Having a clear plan on how different measures could interconnect over time is also recognised for climate resilient infrastructure (Vallejo and Mullan 2017). Additionally, the dynamic and constantly evolving nature of the knowledge being produced (e.g. progress on modelling) which does not match the planning timelines can more easily be included in a more flexible plan. An example of this is the multi-agency flood plan which is updated each year to reflect learning from events. Furthermore, the voluntary nature of some plans was found to encourage more flexibility in the planning process e.g. (non-)statutory spatial plan Cambridgeshire-Peterborough, however, this would require stronger *actor-based mechanisms* to do so. Therefore, more flexible plans that can be easily updated along with opportunity mapping (or ‘pipelines’) can better influence integration from an FRM and sector-specific perspective.

5.4 Summary

This chapter demonstrated the application of the framework for a range of cross-sectoral integration challenges facing FRM in England. It showed how these elements are interlinked and presented the critical barriers and enablers for integration in FRM. These integration challenges highlighted the need for two-way integration between FRM and other sectors. The ‘push’ for integration from one side to the other was found to vary as the balance of power and influence differs from one integration challenge to the next. However, the findings demonstrated the need for both sides be open to learning about how to adapt their own sectors governance capacity to realise more integration in practice for FRM and other sector objectives. Furthermore, the insights from the profiles demonstrated that each integration challenge is unique and that there is no ideal pathway for integration to progress. However, there are critical interactions between elements that will positively or negatively influence integration, which should be recognised and considered. This chapter supported the answering of research question 2. The next chapter offers another application of the framework for a contrasting case study in Serbia. The broader implications of the findings for integration across policy and practice are presented further in Chapter 8.

Chapter 6 Assessing integration in Kraljevo

Serbia: flood response to flood risk management

This chapter uses the framework developed in Chapter 4, to assess Serbia's journey from a focus on flood response towards Flood Risk Management (FRM). However, given the multi-hazard context in Serbia and their ambition to align with global policies on Disaster Risk Reduction (DRR) and Disaster Risk Management (DRM), these terms are used frequently instead of FRM. This chapter builds upon the contextual information on FRM in Serbia and the municipality of Kraljevo, introduced in Section 3.5.2. The framework is applied to analyse the current and potential integration profiles using the data collected from document review and interviews with FRM professionals both at the national level and in the municipality of Kraljevo. Similarly, to Chapter 5, the assessment is followed by discussing the interactions between the elements of integration and reflecting on the key barriers and enablers for integration identified in this case study. This chapter contributes to answering research question 2: *How can the assessment of these elements be used to identify integration profiles for different FRM integration challenges in different contexts?*

6.1 Current integration profile

This section explores the current integration profile for FRM in Kraljevo, Serbia. The integration challenge for FRM identified in Serbia is the desire to move from a focus on flood or disaster response to integrating more FRM strategies - preparedness, prevention and risk reduction (as highlighted in Figure 3-15). Key drivers for this desire for change are the recent floods (2014 and 2016) along with regulatory changes (Law on Emergency Situations and Water Law), as introduced in Section 3.5.2. In comparison to Chapter 5, here the detailed sectoral analysis is not completed given the lower maturity of FRM in Serbia. Nevertheless, the assessment does address integration between FRM and the emergency management sector because of the extension of responsibilities at the local level for

emergency management actors (or civil protection) to wider aspects of FRM (jointly with other local actors). Furthermore, given the weak economic situation in Serbia, FRM is increasingly dependent on investment from international donors (e.g. UNDP, European Commission, World Bank).

Figure 6-1 presents the FRM integration profile identified for Kraljevo, Serbia. Overall, the evidence showed that despite the improvements to the *rule-based mechanisms* (moderate to weak strength) there is very limited progress on realising integration in practice with weak integration in *interventions* and *policies*. However, an optimistic finding is that despite weak *resource-based mechanisms*, the proactive nature of the individuals identified in the municipal Department of Civil Protection (DCP) team, built *actor relationships* (especially bonding) and generated *risk knowledge*. Overall, it was identified that Serbia’s progression on FRM is in the early phase of enabling integration. For this reason, capturing synergies across FRM and other sectors such as the environment and housing, is unlikely in the short-term. However, the direction of travel is positive through support from international donors and determined boundary spanning individuals, despite underlying challenges, such as war/ political conflict and weak economy. Further insights and evidence into this integration profile are described within, split into the governance capacity and the realisation of integration in FRM.

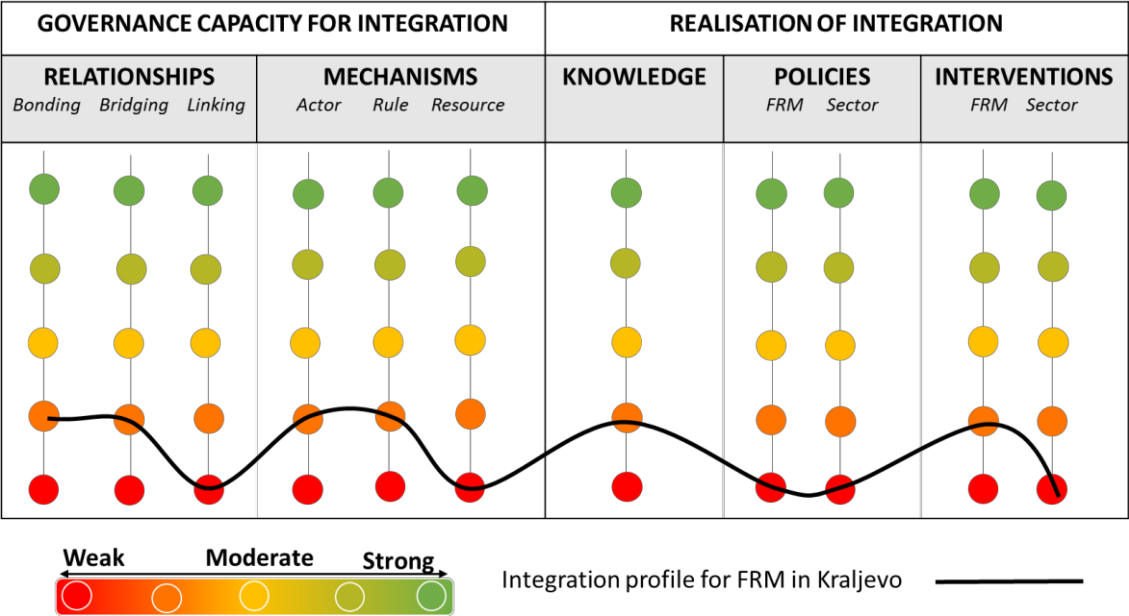


Figure 6-1 FRM integration profile for Kraljevo Serbia

6.1.1 Governance capacity for integration

Overall the actor relationships were identified as being weak to moderate strength, as depicted in Figure 6-1, with stronger *bonding relationships*. The new *rule-based mechanisms* – Law on Emergency Situations (LES) and Water Law - did adjust roles and responsibilities for FRM and emergency management, in particular increasing the role of local governments. However, both the secondary data and the interviews showed that these rules have not been supported with sufficient *resource-based* (e.g. staff) and *actor-based mechanisms* (e.g. training, partnerships) for successful implementation. Figure 6-1 demonstrates these weak *resource-based*, and moderate to weak *actor-based* and *rule-based mechanisms*. These mechanisms are discussed herein, in combination with the relationship strength.

The Kraljevo Department of Civil Protection (DCP) was established in the municipality to implement requirements under the LES (e.g. emergency response, establish volunteers and conduct risk assessments) and the responsibility for 2nd level rivers is shared across the DCP and the Public Firm for Urban Landscaping (UL) (similar to urban planning). Evidence from the interviews identified that the newly established DCP played a central role in bringing together all the important actors at the local level and in linking to the national level to implement the new legislation. The strong willingness of the DCP to cooperate with others, and commitment to building trust, has resulted in strengthened *bonding and bridging relationships*. Furthermore, the interviews suggested that the DCP promote a collaborative and friendly way of working, as demonstrated in the following quote, indicating how much easier it is to work together if the willingness is there amongst actors.

Where you have that connection and understanding and people that are ready to work and contribute you don't have problem. (Department head DCP SB-01)

This proactive way of working helped the DCP to build important relationships with other actors responsible for implementing the new legislation (LES and Water Law). The *bonding relationship* between the DCP and the mayor is critical during an emergency. In Kraljevo the relationship was found to be very strong as both parties know each other personally and have built trust over time, making it easier for them to align mind-sets and communicate easily (SB-05; SB-01). Additionally, some city council members ('sector leaders' appointed by the mayor to coordinate response activities and local public interaction) were found to have strong relationships with the DCP through experiences in the 2018 summer floods,

where the DCP provided them with technical and logistical support (SB-12). The following quote highlights the importance of having a shared understanding and willingness to work together and the need to interact both formally and informally;

He [sector leader] is a good guy. It is very important that we are friends and we understand each other. (Department head DCP SB-01)

Although these examples illustrate strong *actor relationships* within the local government, the interviews with the DCP, Sector Leader and a representative from UL revealed that many members working in the government are new to this collaborative way of working, thus struggling to understand their role and take responsibility to make decisions (SB-13; SB-01). The following quote demonstrates this reluctance to collaborate and take responsibility for decisions, also highlighting this issue as a broader cultural challenge in Serbia, further indicating the need for additional capacity building and training for actors to adapt to this new way of working.

We have some problems in our country. Our people don't know what the team are doing. When we have a problem, everyone says that I am not in charge. We must sit and talk and have an opinion together, that's in our country. Everyone arms crossed and passing it on to someone else. It's a big problem, for every aspect of work. (Urban Landscaping representative SB-08)

To avoid this hierarchical organisational culture, the DCP work outside of the main government office allowing them to implement a more collaborative, proactive and open way of working with one another. This is demonstrated by following quote, which further indicates that this challenge is reaching beyond FRM;

We are lucky that we are here and not in the building [of the local government] because our relationships are warmer and that reflects on our job after that. (Staff member DCP SB-15)

Another indication of the lack of knowledge and awareness about actors' responsibilities and the inability to act independently is demonstrated through the implementation of the Local Operational Flood Plan. Throughout the implementation, the Urban Landscaping representative (who acts as the Chief Defence Officer) was found to be quite reliant on DCP for direction, as illustrated by the following quote;

My role is that [DCP head] calls me every 5 minutes and that is how I start to work. (Urban Landscaping representative SB-08)

Furthermore, the challenge to implement the plan is exacerbated by the lack of available *resource-based mechanisms* within the municipal budgets to fund maintenance and infrastructure on the 2nd level rivers (SB-08; SB-01). This lack of funding limits the ability of the Urban Landscaping public firm to hire technical staff to conduct research and

investigations, or to pay for outsourced studies, as is demonstrated in the following quote. In addition to this, the 4-year public sector ban on new employment meant that public sector organisations (e.g. municipalities, water companies or SEM) could not hire more staff even if they found the money to do so, limiting their ability to develop *knowledge* and implement *interventions*.

He [representative of Urban Landscaping] has to take really tough decisions and we have a lack of manpower because he doesn't have budget to pay for experts for somebody extra. (Department head DCP SB-01)

Another challenging relationship identified from the interviews is between the Sector for Emergency Management (SEM) and the DCP team, given their different culture and mind-set. The directors selected within the SEM were those that worked in the previous civil protection military style system ("command and control" thinkers) (SB-01), a very different culture to that promoted in the LES, which emphasises the role of local government. To create such a culture shift, SEM staff need to undergo a significant mind-set change to embrace the new distribution of responsibilities. It was identified that there is limited two-way communication, feedback or discussion between the DCP and SEM, although they do cooperate for serious events as the SEM have an emergency call centre and better access to equipment and resources nationally (e.g. pumps, boats, and for training events) (SB-01). This indicates that they only cooperate on a formal basis and do not have more informal relationships as found with the other actors who used terms like 'warm' and 'friendly' to describe their relationships. Furthermore, it was identified by the DCP, that the SEM are more accustomed to monitoring activities, such as keeping control over activities at the municipal level rather than directly supporting them (SB-15). In comparison, it was identified that the DCP feel like they have a lot of obligations through the new LES legislation but no power or resources to implement FRM or emergency management in the best way, despite their motivation to do so (SB-01; SB-15). Overall, this weak relationship with SEM indicates the lack of recognition of the extent of change that is required to implement the new legislation (*rule-based mechanisms*) at the local level. Furthermore, it is highlighting the sheer lack of training and support (*actor-based mechanisms*) provided for all actors to work towards a new culture of collaboration at the local level that captures synergies between FRM activities (e.g. risk mapping) and emergency response.

Another rule under the LES was to establish and train Civil Protection Units, which include volunteer Civil Protection Commissioners (CPC) who are typically members of the public

or staff from Public Utility Companies (PUC). The DCP was very successful in implementing this component of the LES because they realised how important it was to build *linking relationships* with the public (SB-01; SB-15; SB-07). The DCP were identified as strongly valuing their dedication and commitment to supporting CPCs in preparedness and response activities (e.g. checking critical points and water levels) (SB-15; SB-01; SB-17). Similarly to the DCP, it was identified that there is tension between the SEM and the CPCs (trained by the DCP), as the CPCs were found to feel like the SEM do not recognise their efforts (SB-17). However, these new obligations with CPCs were again not supported with any additional *resource-based mechanisms*, leading to frustration in the DCP team, as demonstrated in the following quote;

The government is putting more and more commitments and the funds are the same. (Department head DCP SB-01)

Although some *actor-based mechanisms* (e.g. City Emergency Headquarters, trainings, consultation meetings) are in place which help to align mind-sets and increase communication intensity among actors, it was identified that these are not functioning effectively (SB-01; SB-12; SB-15). Starting with the implementation of the LES, the municipality successfully established the Emergency City Headquarters (22 people). This is the only multi-actor decision-making partnership identified which focuses on emergency response. Figure 6-2 presents a detailed figure of all the actors involved in emergency management and Appendix K provides more details on the different actor roles. City Emergency Headquarters includes a diverse range of members from police to municipal planning departments and councillors, but no representatives from the community. However, the media and members of the public can be invited (SB-01; SB-15). Informally the DCP coordinates this group on behalf of the city administration and uses information collected by specific ‘expert groups’ to propose decisions for approval by the group (e.g. declare an emergency situation). The remit of City Emergency Headquarters is limited to managing disaster response and minor preparedness actions. However, they do meet regularly during non-emergency times to prepare reports on completed work and on planned activities (e.g. checking risky roads before the winter and assessing possible locations for forest fires before the summer).

Additionally, it was identified that there are meetings where different actors gather to be consulted on updates to the Operational Flood Plan or for multi-actor trainings based on a project by project basis (SB-01). Although the partnership is a helpful start to bring actors

together, it was found to be insufficient to align mind-sets across actors to fuel a cultural shift. This indicates the need for complementary training to help actors to understand their roles and take responsibilities for them, building their willingness to contribute and engage in decision making.

Figure 6-2 Information flow between actors for emergency response in Kraljevo

Yes, that is the situation from 2014 to now, every year we have a little bit more for the water sector and we are hoping that next year it is going to be a better situation. 2.3 billion dinars [20 million euro] from the water fund. That is not very much. It is the investment, the technical documentation, preparing the plans. The most important thing is the maintenance of the objects and we have many water objects and the most of money is going on the maintenance. (Serbia Water representative SB-04)

2 rivers overlap but are constrained by insufficient funding and capacity, as evidenced in the following quotes;

We are always trying to help them [municipality] resolve their issues on second order rivers. (Serbia Water representative SB-04)

We have challenges of course, because there is a lack of manpower [at Serbia Water], it is like one or two men on a big territory that they cover at the same time and it is a problem. Sometimes they don't pick up the phone or the network is down. They [Serbia Water] have limited finances for that purpose. (Kraljevo mayor SB-05)

These quotes indicate a mutual recognition and understanding between the actors because of their poor access to *resource-based mechanisms* to implement FRM interventions. The lack of resources results in a lack of integration across the management of 1st and 2nd level rivers between Serbia Water and the municipalities to capture efficiencies and synergies for FRM. However, the donor funding was being used to fill this knowledge gap but on a project by project basis and was rather channelled to generating national level knowledge than local level. For example, the National Risk Assessment (SB-18) and IPA (Instrument for Pre-accession Assistance) study of flood prone areas in Serbia (SoFPAS) project funded the development of flood hazard maps for specific areas of high risk in Serbia (Janjic et al. 2015).

Bridging relationships between sector-specific actors and local government are identified as weak because of the challenges of collaborating with Public Utility Companies (PUC) and neighbouring municipalities. The Law on Self Government amendment in June 2018 now allows for more inter-municipal collaboration. As a result, cooperation agreements (*rule-based mechanism*) are now being signed between some of the municipalities in the West Morava (SB-01; SB-07; SB-11). The changes to the law took a lot of effort locally from municipalities, some national figures – UNDP, Standing Conference on Towns and Municipalities (SCTM) - and the media. Overall, it was found that having such agreements and formal approvals plays an important role in enabling collaboration between actors especially in a hierarchical organisational culture as Serbia. For example, the SEM need to obtain several approvals before being allowed to attend meetings (SB-18), and staff of lower rank cannot agree to support unless they get approval from a higher level because it is not officially part of their mandate e.g. roads PUC (SB-09). These rules thus hinder actors' abilities to realise integration for FRM in practice.

There is collaboration on this level [local] but I [local roads] have to call my boss in Belgrade just to say 'ok we are going to help those guys in Kraljevo because they have problem – do you agree?' (National PUC roads representative SB-09)

Furthermore, the interviews revealed that some PUCs will not take immediate action as requested by the Urban Landscaping firm without a guarantee that they get paid. This is demonstrating the need for cooperation agreements to be in place to support integration and to overcome the challenges associated with a hierarchical organisational culture (SB-08).

Linking relationships between the community and government were also identified as weak. Although the public can interact through the CPCs, Red Cross, local councillors and NGOs, there was a strong recognition that this only reaches a proportion of the public at risk. Therefore, much more effort is needed to increase the communication intensity and mind-set alignment. However, the national level linking relationship is strong between the DCP and the Programme Investment Management Office (PIMO) who are in charge of managing the national funds after disasters. PIMO was found to support local efforts by the DCP with funding and capacity building to implement their new legal obligations (SB-01; SB-15). The DCP needs to communicate with PIMO about giving compensation to the farmers and households, and it was found that they had a good working relationship (CB-15). It was suggested that communication was easier because they are “*closer in age and opinions*” (CB-15). This could indicate that they represent the next generation who are more open-minded and willing to work collaboratively, thus embracing the cultural shift. This is shown in the following example where PIMO were willing to listen to suggestions from the DCP and discuss any existing issues.

For example there were two cases where I didn't agree, there was one guy [from PIMO] who I never met and I called and said well I think it's like that and I think different and he said well I call you in 5 minutes. ... I thought he would never call. Actually, he called me and said this is very strange here, it is not right and after that we have very good communication with them. (DCP staff member SB-15)

Figure 6-3 presents the strength of the bonding, bridging and linking relationships in more detail than presented in Figure 6-1 and discussed above. This visualisation helps to demonstrate the complexity of the actor relationships and the variations in strength even within the different categories of actors. Figure 6-3 was developed based on the information provided in the interviews in Serbia at the national and local level. Overall, there is a clear distinction evident between the relationships where there is a similar openness and willingness to work together (e.g. DCP, Serbia Water, mayor, CPCs, PIMO) – even in the absence of sufficient *actor- and resource-based mechanisms* – and the relationships between actors with a more traditional way of working (e.g. SEM). Somewhere in between

are the actors that are open to take on their responsibilities but need more guidance and support to do so (e.g. Urban Landscaping).

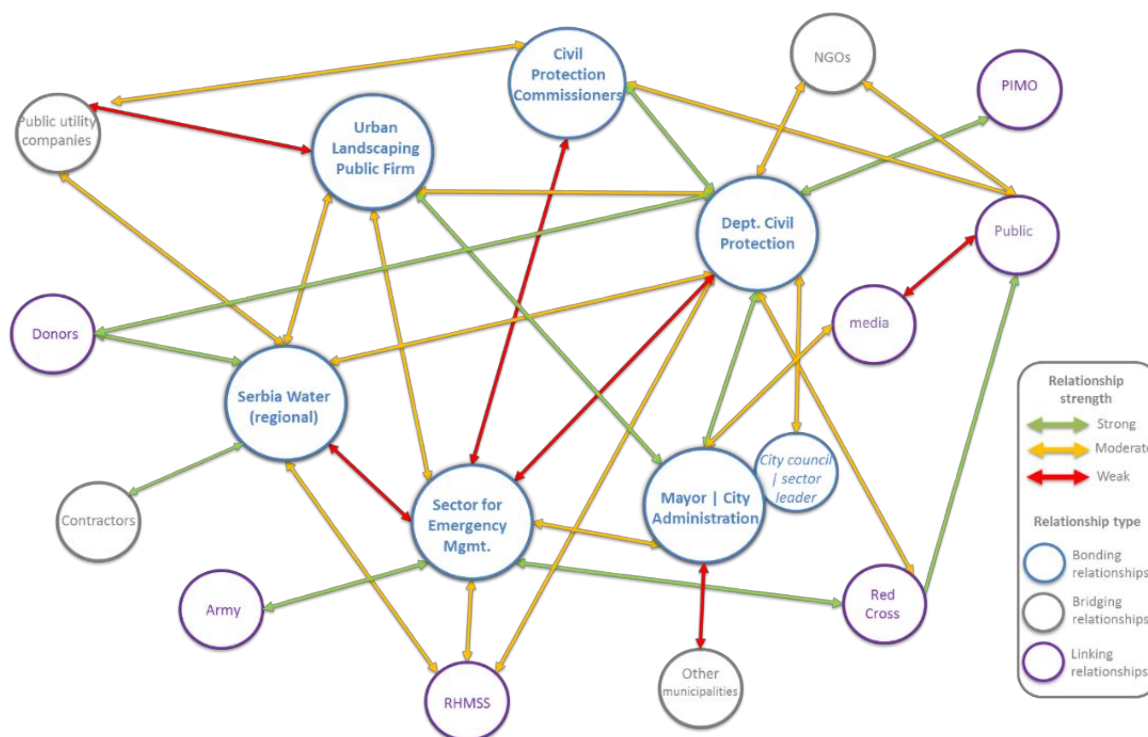


Figure 6-3 Summary of the strength of key actor relationships – bonding, bridging and linking – identified in Kraljevo from interview data.

6.1.2 Realisation of integration

Overall, the realisation of integration for FRM through policies and interventions was found to be weak in Kraljevo predominately caused by the lack of *resources-based mechanisms*. However significant improvements were identified in the development of risk *knowledge* driven locally by the DCP, as depicted in Figure 6-1. Two strands of *risk knowledge* were required from the legislative changes, one in connection with the LES which requires local risk assessments (for multiple hazards), and another in connection with the Water Law whereby flood risk assessments need to be prepared for river basin districts. Serbia Water are responsible for completing the flood risk maps under the Water Law but have not completed them due to a lack of resources (SB-04). Due to the proactive nature of the DCP team, they have instead prepared their own risk maps based on local knowledge of historic events (no modelling) with support from the CPCs and using the knowledge gained from completing the recovery/ damage assessments. This resulted in a local risk assessment having a dual purpose both for the local risk assessment under the LES and for the risk

mapping required under the Water Law, until further studies could be completed. However, further developing this knowledge was found to be challenging because of the lack of skills at the municipal level and by some consultants) to develop the risk assessments, and the lack of funding to outsource specialised studies or research (SB-01; SB-04). Furthermore, the DCP identified that collecting data across organisations is a very slow and tedious process, and that most organisations do not use GIS to store their data and are not familiar with a culture of open data (SB-14), although this is something the DRM programme is trying to encourage (SB-07). Therefore, building trust amongst actors is a crucial step to enable data sharing across actors (SB-01; SB-14), as demonstrated in the following quote;

But nobody wants to share the data. For my city, I know people, they trust me, and I'm not going to do bad things with it. People are un-trustful; you don't have that kind of built connections between different institutions. Even if you have laws, you have slow exchange of information and that's the problem. (Department head DCP SB-01)

This quote indicates the need to build strong relationships between actors and the benefit of strong personal connections because even if data sharing regulations are implemented, these might not function. The DCP illustrated their proactive and open attitude to data sharing by collating their data and maps on a Google Earth visualisation tool to make it openly accessible on their website, along with any reports related to risk information (SB-14). This highlights how they prioritise data sharing and their desire to make it more accessible, despite the current constraints (SB-01, SB-14). Overall, risk knowledge is slowly being generated but the lack of resources is making it a lengthy process. Additionally, the lack of *actor-based mechanisms* makes it difficult to gain access to data from other sectors and to generate risk knowledge jointly. For this reason, *knowledge* was identified as moderate-weak strength, as depicted in Figure 6-1.

Overall, the *FRM* and *sector specific plans* were identified as weakly integrated as illustrated in Figure 6-1. Although the *rule-based mechanisms* led to some new national strategies on DRM, no detailed new *plans* on FRM are developed yet to support realising integration in FRM practice. Currently, under the Water Law there is a National Plan for Flood Protection (5 year), as well as annual plans led by Serbia Water and an Operational Flood Plan led by the municipality. These are however not based on risk modelling and mapping (SB-01). The National Plan is regularly updated through multi-stakeholder meetings at the Water Directorate to include new data available and to include the lessons learned from any flood events. However, *FRM plans* for River Basin Districts, which would focus on a range of interventions (not just flood protection) are expected to be developed

after the risk assessments have been prepared as required under the Floods Directive. Overall, there is a lot of potential to integrate plans developed across the West Morava River Basin and to account for the overlap across administrative boundaries. Furthermore, it was identified that there are opportunities to better align *sector-specific policies* on urban planning, agriculture, utilities and economic growth with FRM but the knowledge to do this effectively is still missing and highly dependent on building strong *actor relationships*. On the whole, the lack of knowledge is negatively influencing their ability to develop integrated policies and interventions for FRM, thus hindering the enforcement of laws.

Similarly, poor management of trade-offs and a lack of efficiencies and synergies gained across *FRM and sector-specific interventions* were identified in Kraljevo, thus shown as weak in Figure 6-1. For example, efficiencies are not being maximised across the construction and maintenance of *FRM interventions* on 1st and 2nd level rivers (SB-01; SB-04). Additionally, limited examples of synergies between river protection infrastructure and other infrastructure (e.g. creating recreation spaces alongside flood storage areas or combining road and flood infrastructure) were identified (SB-09). However, there was recognition of the need to make risk-informed investments in local economies, e.g. building sports stadiums and new industries (SB-01). Furthermore, it was identified that negative side effects can occur e.g. ‘moving the problem’ from one community to another or increased risk from the poor drainage of new infrastructure (SB-06). Subsequently, land management and flood risk are not well integrated, for example, poor efforts were made to protect forests to avoid erosion and reduce runoff to manage flash floods (SB-12). For preventing risk, there is very weak progress on establishing land use regulations (*rule-based mechanisms*) for housing development and homeowners that receive flood compensation are not obliged to ‘build back better’ (SB-08). However, some lessons have been learnt where telecom poles were not rebuilt in the same place after multiple failures from triggering landslides (SB-16). This indicates that lessons are learnt through direct experiences rather than proactive planning and regulations. Moreover, illegal housing (e.g. on the side of a river), the use of bad construction practices (e.g. filling in watercourses with concrete) and members of the public dumping waste in rivers were repeatedly mentioned by interviewees (SB-10; SB-17; SB-15; SB-16). This suggests the need for wider behavioural change from the public, as demonstrated in the following quote;

People here are not realising that and also, they are not ready to do their contribution. They will not clean the channel in front of their house they are expecting me from Kraljevo to go the village 30km away to clean it. (Staff member DCP SB-15)

This also indicates that more public education and training on FRM is needed, a gap which the DCP, CPCs and NGOs are trying to fill with activities. For example, by running ‘little civil protection’ in schools, Civil Protection Day and NGO-led cleaning the river projects (SB-16; SB-17; SB-10). For emergency preparedness and response, it was identified that there are limited resources to buy new equipment or vehicles, and fund training activities, thus the DCP depend heavily on donations (SB-01; SB-17). Additionally, the DCP were found to need more response equipment at strategic locations since Kraljevo municipality has a large territory and it is difficult to manage problems located 150km away (3.5-hour drive) from each other in mountainous terrain, as demonstrated in the following quote;

We don’t know with these flash floods they are a really big problem for us because we have so many small flash flooding rivers and large territory. We cannot cover with manpower. [...]. If its 2nd level its 50km from this office on mountain terrain where you cannot go with your car and your equipment and everything. (Department head DCP SB-01)

Furthermore, the current forecast and warning information produced by the Republic Hydro-meteorological Service of Serbia (RHMSS) is constrained by a lack of data and models for first and second level rivers, due to a lack of technical resources and staff to generate the models (SB-02). Communication channels between national actors (e.g. RHMSS, SEM, Serbia Water) and information flows to the local level were found to be poor (SB-01) despite some donor projects aiming to build forecasting and warning capabilities within the RHMSS (e.g. IPA-Flood). Therefore, the current information available is used predominately for national level decision making (e.g. reservoir operation, checking defences, deciding to implement the operational plan) because it is not localised enough for action at the municipal level.

We don’t read the forecast information because they are not precisely for that territory, they are for wider terrain. That’s the problem we don’t have that localised information. They said ok it’s going to be rain – but where? Here there is sun! (Department head DCP SB-01)

This quote demonstrates the need for localised knowledge to enable effective FRM interventions. Addressing this need, national and local communication centres are being used and an interactive platform is being tested (called DEWETRA) to share real-time information more easily nationally (SB-02). However, the implementation and acceptance of such innovative tools as part of daily practice was found to be a lengthy process and is not yet used systematically (SB-02). Again, this indicates the cultural shift required for more open sharing of knowledge and data, and the acceptance of new technologies to ultimately generate more knowledge that supports FRM in practice.

Overall, this integration profile in Kraljevo Serbia demonstrated a low degree of integration, whereby, the changes to *rule-based mechanisms* were insufficient to enable integration due to insufficient availability and quality of *resource- and actor-based mechanisms*. Constant setbacks (e.g. flood events) and inherent constraints (e.g. lack of funding) make it difficult for FRM professionals in Serbia to progress their capacity but individuals are showing positive progress despite these constraints. The integration profile also demonstrated how individual motivation and taking a proactive approach can increase the governance capacity and realisation of integration – but only to a certain point and at a slower pace than if supported with more enabling mechanisms. This applies for example to the resulting time lag between developing the risk knowledge and producing and implementing FRM plans and interventions. Therefore, despite the ambitions outlined in the DRM Action Plan, there remains dependence on emergency response and poorly maintained structural measures.

6.2 Desired integration profiles

Considering the transitional nature of the current integration challenge for FRM in Serbia, this section captures the planned and desired changes to mechanisms identified in the interviews and maps their expected influence on the integration profile in the short (1-3 years) and medium to long term (3 -10 years). Further insights and evidence into these desired integration profiles, focusing on changes at the local and regional levels for Kraljevo municipality and West Morava River Basin, are described herein. Overall, the findings suggest that the pace of change is expected to be gradual.

6.2.1 Short-term integration profile

The critical short-term ambition identified for progressing integration in FRM was the need to further build the governance capacity for integration, and at a minimum to increase risk *knowledge*, with an expected focus on transitioning from flood response to more flood preparedness interventions. Figure 6-4 visualises how these expected changes to the elements of integration in the short-term compare to the current situation for Kraljevo. Next, the expected improvements to *actor-, rule- and resource-based mechanisms* are discussed in relation to changes to the new integration profile.

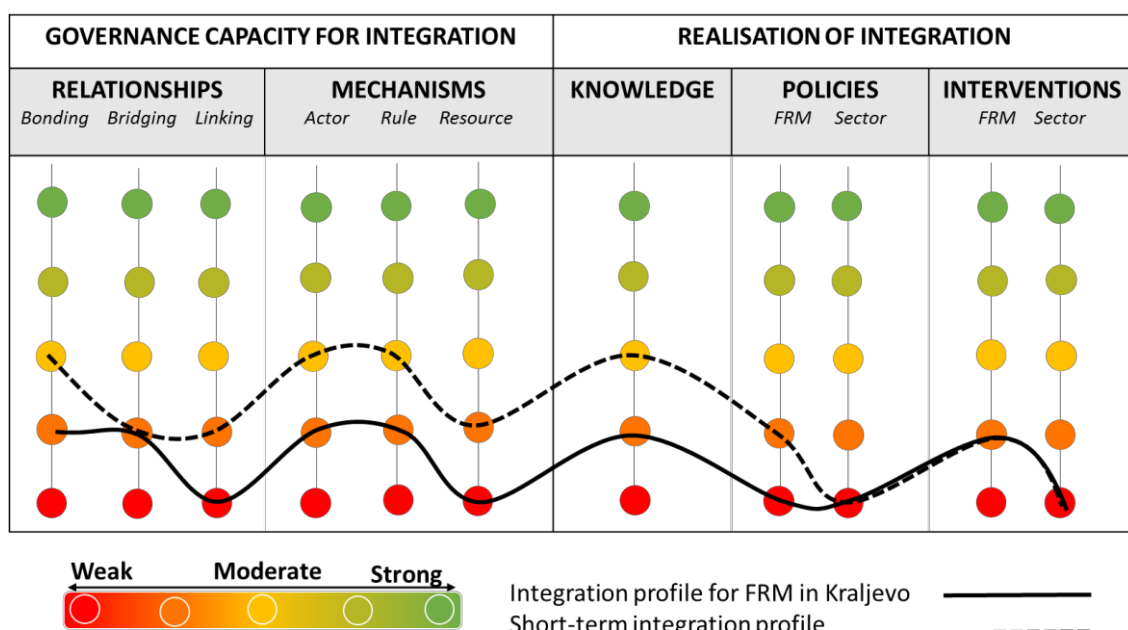


Figure 6-4 Short-term integration profile compared to current profile for Kraljevo

As explained in Section 6.1, there is a lack of *actor-based mechanisms* to support training and knowledge exchange for actors to align their mind-sets on FRM and increase their communication intensity, thus hindering the governance capacity for integration. It was identified that the *City Emergency Headquarters* can play a more important role in increasing members' knowledge of their responsibilities, and to gain a wider holistic view of DRR and the need to work collaboratively (SB-01; SB-12; SB-15). The National Emergency Headquarter has been expanded to focus on DRR at a national level and therefore represents a good starting point to working towards a local DRR partnership that can strengthen *bonding* relationships. However, the bridging relationships are not expected to increase significantly due to the time required to adjust mind-sets. The *linking relationships* are expected to increase due to continued support from the CPCs.

The next *actor-based mechanism* identified is at the regional level, involving the development of the *West Morava River Basin Partnership*, an initiative lobbied for by the DCP and others (SB-01; SB-07; SB-11). The purpose of the partnership is to enable interaction between multiple stakeholders in the river basin especially political actors (mayors) in each municipality, and the technical staff responsible for risk assessments across hazards, emergency response, and management of 2nd level rivers (i.e. the DCP and UL in each municipality) (SB-01; SB-11). This would include joint approaches to additional *actor-based mechanisms*, for example training CPCs and building capacity across

municipalities' DCP staff (SB-01; SB-11), thereby improving *linking relationships*. This is expected to contribute to realising integration in practice by gradually and jointly generating *risk knowledge* across the river basin. In addition, it can gradually play a role in developing FRM plans (e.g. regional plan for civil protection) and joint *interventions* (e.g. defences, community engagement) (SB-01). This would help to realise more integration in practice for FRM by capturing efficiencies and synergies across flood response and preparedness interventions at the river basin level.

The head of DCP expressed interest in involving as many stakeholders as possible in the partnership upfront, including public, private and voluntary sector, along with international donors and organisations (SB-01). However, the following quote indicates that despite their ambition to ensure inclusivity, they recognise that achieving such an inclusive approach is a huge task, considering the strength of the current actor relationships. The aim therefore is to start by gaining support from municipalities with a focus to build a uniform civil protection system for the river basin.

The West Morava cooperation is going to help engage more people, more ideas. We have to include everyone. We have done a lot. Now we have identified all possible partners in the West Morava basin – there are about 100. Start by getting the municipalities on board. (Department head DCP SB-01)

It was identified in the interviews that there are different ideas about the possible legal and institutional setup of the partnership by different municipalities. For example the options could be 1) a strategic (political) review group including mayors of each municipality and a working group of more technical DCP members, 2) a new physical institution that represents all 17 municipalities departments of civil protection e.g. one engineer from each municipal department sits there once per week, or 3) more of an association that has no physical space but meets regularly (SB-01; SB-11). This demonstrates the array of potential options with different levels of formality and structure, thus requiring joint decision-making – especially among the political actors – to ensure the success of the final arrangements. One potential conflict was for example identified with the SEM who were found to be less supportive of the inter-municipality partnership, as it potentially overlaps with their existing regional office system (although this does not have river basin boundaries) (SB-01). However, other actors expressed concerns over the SEM taking the lead as this could result in a lack of inclusion and diversity of actors across the DRM spectrum (SB-11; SB15). It is therefore expected that the political backing needs to be first secured for the partnership, to give it 'weight' among other actors (e.g. SEM) and afterwards a more diverse range of actors

can gradually get involved (SB-01; SB-11). This indicates the time needed to progressively adjust the mind-sets of actors to work towards a culture of collaboration.

Another *actor-based mechanism* identified was the need to develop a *data sharing tool or platform* for users to collate and share geospatial data and real-time information (SB-01; SE-14). As explained in Section 6.1.2, the DCP currently provide the data they collated available on their website and on Google Earth, which can be used by other actors. However, the data is not yet comprehensive because of the data sharing limitations of other organisations, and its inability to function for real-time multi-agency response situations. The following quote demonstrates the ambition, for improved data sharing;

It is very important for the rest [of the actors] that we have one place for collecting all the information and sharing it with everyone. We need that kind of platform where everyone can see what is happening there and maybe to recognise some situation that he can help or his firm. (Department head DCP SB-01)

The PIMO is pushing for GIS to be used in all institutions to facilitate data sharing but there are problems with computing power and data management (SB-14). For this reason, in the short-term it is expected that the DCPs arrangements for data sharing will be improved, and in the longer term this can evolve into a multi-stakeholder tool if funding emerges. Overall, having stronger knowledge sharing arrangements, is expected to build *actor-relationships* and strengthen the availability and access to risk *knowledge*. Subsequently, more opportunities for efficiently developing knowledge (e.g. joint risk modelling) and capturing synergies across FRM interventions can be gained (e.g. during response to flooding).

The *rule-based mechanism* that is expected to improve in the short-term is the development of more *cooperation agreements* across municipalities to formally work together across administrative boundaries, enabled by the change in Law on Local-Self Government. The *West Morava River Basin Cooperation Protocol Agreement* is currently between two municipalities. In the short term, more municipalities are expected to sign the cooperation agreement leading to more efficiency in generating *knowledge*, e.g. conducting studies or investigations. In the longer term this could lead to the delivery of more efficient joint *interventions* on 2nd level rivers. Similarly, more contracts or agreements (*rule-based mechanisms*) can be established between PUCs and the municipalities for sharing data and agreeing funding for emergency response/recovery projects. This can improve *bridging relationships* to capture more opportunities for enabling integration in FRM.

Improvements to resource-based mechanisms is expected to be limited in the short-term because of the economic situation in Serbia, although progress is expected to work towards a joint fund across municipalities on DRR which could be implemented in the longer term. It is envisioned by some actors that such a joint funding pot can take a percentage of the local budgets and allow them to decide jointly how to spend it across the basin (SB-07) – somewhat similar to the local levy fund in England. It was identified from the interviews that local governments are currently debating about how to decide on this amount, basing it for example on population at risk, area at risk or percentage of income. Such a joint funding pot could significantly improve the actors' ability to realise integration in practice across the river basin through generating joint knowledge, policies and interventions – as demonstrated in the following quote;

The civil protection team can manage better if they have stronger collaboration with other municipalities so they can join together resources and find better solutions [for DRR/ FRM].
(Department head DCP SB-01)

In the meantime, however, the partnership is expected to help channelling donor funding in a more effective way and to help actors to jointly prepare bids/proposals to access such funds for priority interventions (SB-01; SB-07). Furthermore, efficiencies can be identified to share resources and to jointly fund projects, given their existing budgets across municipalities. Additionally, more in-kind support from NGOs and CPCs can be utilised to conduct joint outreach and engagement activities, thus helping to build *linking relationships* with the communities.

In summary, the combination of mechanisms being proposed in the short-term are expected to build momentum and to begin strengthening relationships across multiple actors in Kraljevo municipality and the West Morava River Basin. This is expected to help in building their capacity for integration and to develop risk *knowledge* jointly to work towards realising integration in practice. However, true impact of such mechanisms is expected to only be seen in the medium to long term for realising FRM in practice and capturing synergies and efficiencies across multiple FRM interventions.

6.2.2 Medium to long term integration profile

In the medium to long term (3 – 10 years), a more holistic approach to manage flood risk through addressing risk prevention, reduction and managing residual risk is desired. It is expected that more integration can be realised in practice, through stronger *resource-based*

mechanisms that can fund *knowledge* development, *FRM* and *sector-specific plans* and *interventions*, and a continued focus on *actor-based mechanisms* to gradually break down the silos and to generate a cultural shift towards collaboration. Figure 6-5 visualises these expected changes to the key elements of integration in the medium to long-term in comparison to the current situation in Kraljevo. The key differences compared to the short-term profile are the increased strength of bridging relationships and resource-based mechanisms to realise more FRM and sector-specific policies and interventions.

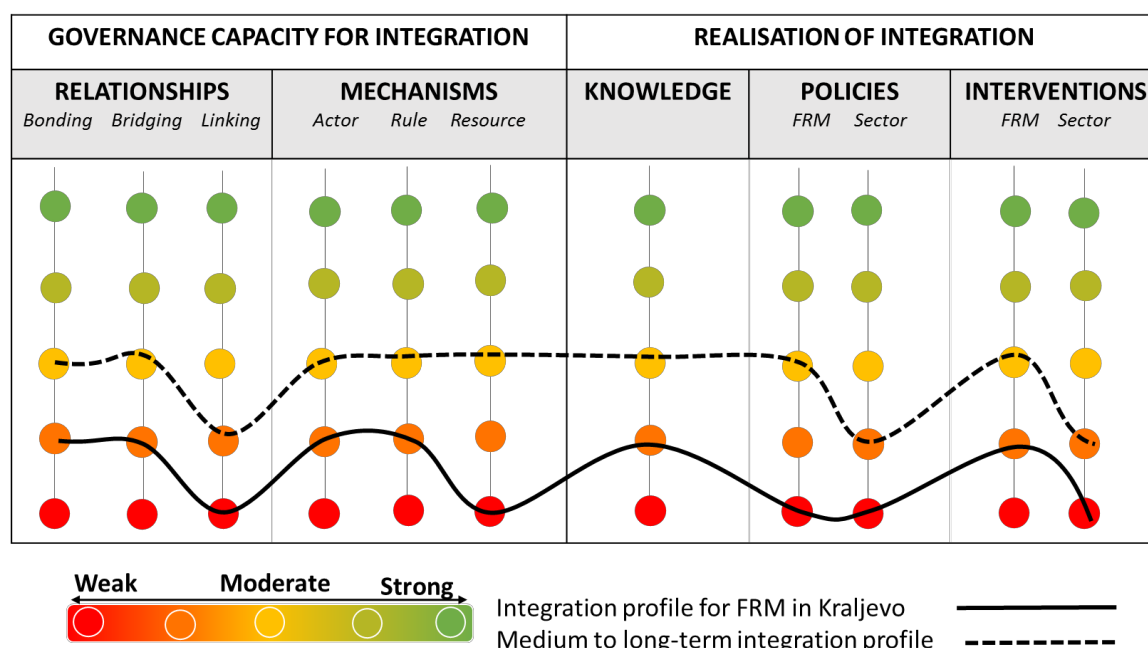


Figure 6-5 Medium to long term integration profile compared to current profile for Kraljevo

In the medium to long-term, it is expected that *actor-based mechanisms* will be further strengthened to build capacity for FRM integration among actors, in particular the partnerships at the municipal level i.e. Emergency City Headquarters and river basin level i.e. West Morava River Basin Partnership. Assuming that the West Morava River Partnership is established with some institutional setup and without hitting any significant barriers, it is expected that the focus can gradually widen to risk reduction and prevention. Ensuring diversity and continuity of actors engaged will support such a broadened focus, and increase their ability to generate joint knowledge, plans and interventions, as advocated by many interviewees (SB-01; SB-07; SB-11). Additionally, it is expected that establishing more focused sub-working groups on planning, risk reduction and residual risk - both at the regional and local level - would help to focus related decision-making processes. This widened focus is however likely to happen in the longer term. Overall, if wider engagement

is achieved, this is expected to strongly influence the alignment of mind-sets and increased communication intensity, thus strengthening *bridging relationships* as well as *bonding and linking relationships* especially with other municipalities and sectors, such as transport, planning and community representatives. Furthermore, if sufficient joint *knowledge* is developed within the partnership, it can support developing and approving *integrated plans* at the regional and local levels – in particular the FRM plans as required under the Water Law and local response plans as required under the LES.

The *resource-based mechanisms* are expected to improve in the medium to long-term, whereby a *joint fund* is available across the West Morava River Basin. The fund can be used to finance prioritised *FRM interventions* and to build staff capacity and resources that can be beneficial across the catchment. The allocation of new staff for both coordination and technical duties either within the partnership or in specific local government offices would significantly improve their ability to generate *risk knowledge* and increase communication intensity between actors, thus capturing opportunities for realising integration in FRM. By providing more resources, the *actor relationships* would be expected to grow over time because actors would interact more through projects and see the results of their collaboration e.g. more efficiencies and synergies across interventions. Although local funding is expected to be available on a short timeline, national funds are likely to have strengthened with the introduction of a *long-term national DRM investment fund* (as suggested in the DRM Action Plan). This fund could be accessed more easily and provided on a longer timescale for large infrastructure improvement projects, thereby increasing the capacity to realise *integrated interventions* in practice. In this time period it is expected that it would be difficult to develop any national funding mechanisms to incentivise cross-sectoral work (such as Partnership Funding in England). It is still expected that there will be a reliance on donor funding, but the partnership can help making it more accessible by applying and implementing projects jointly. This for example includes, identifying joint FRM projects where efficiencies and synergies can be captured across actors by utilising multiple funding sources, but on a case by case basis. Furthermore, if the efforts to improve the EWS are realised, access to meaningful EWS can be more effectively implemented due to the strong relationships built at the local level that transfer information through the CPCs and NGOs.

In the long-term, the focus of the *rule-based mechanisms* is expected to involve the development of planning regulations (*risk zones*) to ensure more risk-informed development based on the risk maps collated as part of the requirements under the Water Law and LES.

The partnerships can act as a voice to influence the development of the regulations, but this is expected to take a longer period of time before being fully enforced and implemented in planning to result in appropriate behavioural change by the public (many of whom are currently building in illegal areas). The following quotes recognises that such changes will take time and progress in a stepwise way;

We are going to deal with zoning, but it is 3rd, 4th or 5th year. We need new laws. We are going to change maybe two or three new laws before we have done everything. (Department Head, DCP SB-01)

Furthermore, small improvements in the *linking relationships* with communities are expected due to role of CPCs and NGOs but are expected to remain at moderate to weak strength because of the time required to change public behaviour. In addition, the *cooperation agreements* between the municipalities and PUCs are expected to reap success in accessing data for plan making and supporting a multi-stakeholder data-sharing platform.

Overall, reflecting on these two potential integration profiles for FRM, it is clear that achieving integration for FRM in Serbia requires long-term commitment. Despite planned efforts to implement *actor-*, *rule-* and *resource-based mechanisms*, it is expected that improvements will take time, especially considering the time taken to reach the current level of progress on implementing the Water Law and LES. However, the ambition to effectively manage disasters, especially at the local level in Kraljevo is clearly evident among the DCP team and momentum is building at the national level, acting as a crucial factor to enable integration going forward. A challenge that is likely to persist is the adaptation of public behaviour in relation to flood risk, even with significant efforts on engagement by the CPCs. The next sections discuss the interactions identified between the elements of integration and synthesise the key enablers and barriers for integration generated from the application of the framework.

6.3 Interaction between elements of integration

Similar to Section 0, Figure 6-6 conceptualises the critical interaction between the key elements of integration generated from the application of the framework in Serbia. These are labelled 1 to 5 and are discussed further herein, whereby some comparisons are drawn to the English case study and to relevant literature that further supports these findings.

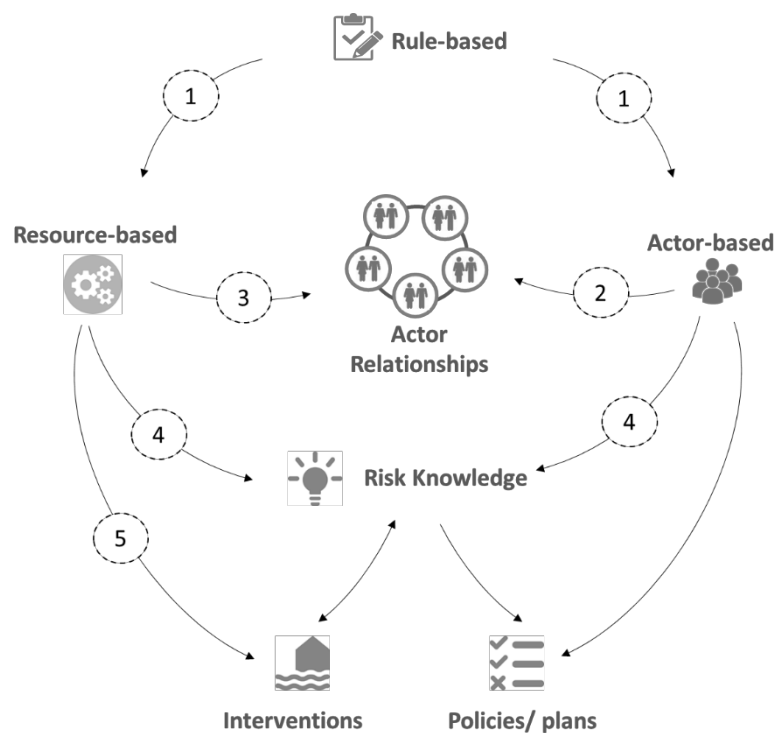


Figure 6-6 Overview of interactions between elements of integration in Serbia

6.3.1 Interaction between rule-based mechanisms, actor- and resource-based mechanisms

The first pattern identified is the interaction between all three types of mechanisms, as highlighted by number 1 in Figure 6-6. Firstly, this case study showed that *rule-based mechanisms* alone are insufficient to realise integration in practice for FRM. Despite the LES and Water Law being updated in a relatively short period of time, they were not combined with the necessary *actor-* and *resource-based mechanisms* to ensure a smooth transition of roles and responsibilities across actors. Furthermore, the new regulations were driven by different purposes and pressures – the LES to align with the Sendai Framework on DRR, and the Water Law to align with the EU policies Water Framework Directive and Floods Directive - therefore requiring separate but complementary strands of *actor- and*

resource-based mechanisms for effective implementation. This could suggest that sometimes other external pressures (e.g. accession to the EU) will dominate the development of new mechanisms and therefore the sequencing/phasing cannot always be controlled. For this reason, a slower more gradual shift in regulations, could have provided more time to improve the supporting mechanisms. It could be argued that greater emphasis could have been placed on putting a mix of *actor-, resource- and rule-based* mechanisms in place from the beginning so they mutually reinforce one another. This also speaks to the findings from the English case study and literature on the importance of having combinations of different mechanisms in place (Gunningham and Sinclair 1999). Furthermore, these findings align with the work of Vermaak (2013) which highlights how large-scale changes, such as those expectations presented in the Water and LES laws, are unlikely to result in widespread change because of the cultural shift that is required to do so.

6.3.2 Interaction between actor-based mechanisms and actor relationships

The Serbian case study provides interesting insights into the interactions between *actor-relationships* and *actor-based mechanisms*, as highlighted by number 2 in Figure 6-6. Based on the data collected, it is evident that a significant cultural shift for actors is required in Serbia. This applies especially for those actors in local governments who need to move away from a ‘siloes/ fragmented’ way of working towards more collaborative, multi-actor governance and decision-making, as advocated by many scholars to manage environmental challenges (Newig and Fritsch 2009, Emerson et al. 2012, Challies et al. 2016). This could be observed in the City Emergency Headquarter (*actor-based mechanism*) where many actors shy away from their responsibilities and do not act in an open and collaborative way with one another. Changing this culture of collaboration is expected to be difficult, particularly if this is the way the actors are used to work and the understanding of their new roles and responsibilities, or the willingness to embrace them, is limited (as seen with the SEM). Taking on the new responsibilities at the local level is therefore expected to be a gradual learning exchange process dependant on the *actor-based mechanisms* in place e.g. coordination staff, partnerships, joint working arrangements, which can enable more knowledge exchange and mind-set-alignment. If there is limited initial and ongoing investment in *actor-based mechanisms*, it will slow down any progress on strengthening

actor relationships to support realising integration in FRM. This demonstrates the need for long-term training and capacity building to support mind-set alignment and increased communication intensity. However, to build trust amongst actors and encourage a shift in culture is expected to take time (Vermaak 2013). Such a length of time is typical, especially considering their lack of history in working together and a lack of maturity to handle collaborative environments (Vangen and Huxham 2003). This is broadly recognised by many researchers, for example those supporting Learning Action Alliances (O'Donnell et al. 2018) and collaborative decision-making processes (Evers et al. 2016).

This framework application in Serbia showed that in the absence of such formal supporting *actor- and resource-based mechanisms*, motivated individuals stepped forward and filled the gap. These individuals, both within the DCP and the local government were found to work within their means to implement their responsibilities to the best of their abilities. Kraljevo was fortunate that a knowledgeable and proactive individual was appointed as the head of DCP having a clear vision and interpretation of their local responsibilities as demonstrated in the following quote;

We are called civil protection, but we are not just civil protection we are DRR. (Department Head, DCP SB-01)

This suggests the need for long-term capacity building and training to continue to sustain these individuals and generate more staff (discussed further in Chapter 7). The development and progress of the West Morava River Basin Partnership draws further insights on the interaction between *actor-based mechanisms* and *actor relationships*. Considering the partnership is starting from scratch, it offers the opportunity to get more actors from different public, private and non-profit sectors involved right from the beginning. However, there is also a trade-off in doing things too quickly because it may be overwhelming for some actors who are unfamiliar with collaborative working who may feel like their power is undermined (e.g. SEM). In comparison, starting with a small number of actors and a narrower focus has an advantage, since members are able to discuss focused topics and actions, to gradually build relationships and to identify the need to involve others to tackle the pressing challenges. This was illustrated as the most feasible and realistic approach envisioned by the DCP: starting with municipal civil protection and mayors, and then gradually moving towards DRR. Such an approach can allow for more gradual changes to capture 'small wins' through improved actor-based mechanisms to strengthen and maintain the relationships between actors (Vangen and Huxham 2003, Termeer et al. 2017).

6.3.3 Interaction between actor relationships and resource-based mechanisms

This application of the framework brought to the forefront interesting connections between the strength of *actor relationships* and the influence this has on *resource-based mechanisms*, as highlighted by number 3 in Figure 6-6. As one would expect, the more resources that are available, the more likely it is for actors to have opportunities to work together, e.g. through a joint fund spent on knowledge development, as seen in the English case study. Considering the significantly resource constrained environment in Serbia, such examples could not be identified, it was however insightful to identify the relative importance of resources for building such relationships.

Firstly, considering the hierarchical culture in Serbia, ‘who you know’ was found to play a role in helping to identify available funds and to a certain extent facilitating access (e.g. through national government, donors or donations). For example, the head of the DCP was found to utilise his network to access donations for CPC uniforms and equipment, and for office equipment for the DCP team (SB-01). This again demonstrates the need to have strong relationships with actors to gain access to some resources when nothing else is available. Serbia Water highlights this challenge for municipalities to access funding for interventions on 2nd level rivers suggesting that national level connections can help to prioritise certain areas, as evidenced by the following quote;

They [municipalities] have limited finances for that [managing 2nd level rivers] purpose but if you have good connection, you know people in some area in some ministry, you can get money but if you don't know people or don't have good connections you are alone. (Serbia Water representative SB-04)

Another way of looking at this interaction is that although *resource-based mechanisms* were crucial for enabling integration in practice, they were not strictly necessary for actors to build relationships with one another. Although it would undoubtedly help, funding was not strictly necessary to build goodwill among actors to act in a friendly and open way and develop a shared understanding of the problem. As was identified for the relationship between Serbia Water and the DCP, although there were funding constraints on both sides, they were able to align mind-sets and were willing to support each other, despite challenges within organisational culture. Another example is the relationship between the CPCs and the DCP, whereby there is very limited funding for CPCs, but the DCP still manage to build their trust through in-kind voluntary action and by recognising the work CPCs are doing.

This is an important finding because Serbia is likely to continue to have funding constraints in the future and therefore should not be too dependent on the emergence of such joint funds to instigate collaboration. Instead working to maintain and nurture the strong relationships that do exist and strengthening additional relationships should be prioritised.

6.3.4 Interaction between resource-based mechanisms, knowledge and actor-based mechanisms

Another interaction identified within this application of the framework was the link between resource-based mechanisms, knowledge and actor-based mechanisms, as highlighted by number 4 in Figure 6-6. The need for investment in developing risk knowledge, including data collection, storage and visualisation, along with promoting a culture of open data was evident. This notably is hindering the progression of plans and interventions locally, thus suggesting that knowledge needs to form the baseline output to enable integration in practice for FRM. The resources to develop this knowledge were found to be supported by donor investments; however, these were mainly targeted at national level data. Furthermore, in-kind resources at the local level were used, whereby the DCP staff utilised their network of CPCs and public utility companies to gather as much local knowledge as possible. This suggests a ‘top-down’ vs ‘bottom-up’ approach to data collection and knowledge generation. The bottom-up approach is often advocated as it more closely includes those with direct experiences and local knowledge e.g. adaptive co-management (Armitage et al. 2008) or collaborative modelling (Basco-Carrera et al. 2017). Nevertheless, a more top-down approach is also necessary to establish more structured standards and procedures whereby the knowledge is collected, analysed and stored in a systematic way, as advocated in the Sendai Framework for DRR (UNISDR 2015b). Kraljevo is an interesting case because the ‘bottom-up’ approach is somehow progressing without funding. Such an approach is still limited however, because the skills of those collecting and analysing the data cannot go beyond collecting knowledge on past experiences instead of understanding the risk through more extensive modelling and risk assessments. The following quote demonstrates this interaction between the top-down and bottom-up knowledge generation;

They [Serbia Water] are responsible to give me that kind of maps and information [for rivers] and they said that ok we are going to give it to you, but we don't have it, and that was 4 years ago. I asked them, 'ok we are going to do our risk maps do you have problem with that?' they said 'no, no problem, it is going to be better that we are going to do because we are just calculating and you have that experience and everything, historical facts. Everything you need we are going to help but do it yourself.' (Department head DCP SB-01)

Interestingly, despite this lack of detail in the data, the process of developing knowledge locally was found to empower and motivate those working on it and helped them to identify the fundamental challenges of sharing data across different organisations (even within the public sector). This is highlighting the need to strengthen those relationships to even gain access to data within other organisations. This suggests the progressive steps that need to be taken to improve from such a low level of risk knowledge. This illustrates the need to invest in data collection but embrace the role of the community in doing so and empower them to support the process, as commonly advocated in FRM and DRR (Newig and Fritsch 2009, Cassel and Hinsberger 2017). Subsequently, this also shows the motivation of the CPCs to take on this role despite few resources to further develop more user-friendly risk communication tools for public engagement. This finding supports others who argue that top-down government centred approaches and pre-packaged solutions by-pass the need for learning, questioning of mind-sets, leadership and co-production (Olsson et al. 2014).

The findings draw an interesting comparison to England which has developed much further on risk assessments and communication, but less so on engaging with communities to co-develop risk knowledge and is still struggling to develop *linking relationships*. Therefore, although Serbia is quite far behind in terms of developing risk knowledge, the fact that Kraljevo has such a strong network of CPCs and their role is embedded in law means they can work more closely with the communities to develop this knowledge. Furthermore, this knowledge co-development process would be enhanced if appropriate resources were provided for the DCP to hire sufficiently skilled staff to conduct risk modelling. At the same time however, the national level efforts are required to gradually change the culture nationally about the value of risk information and to develop the necessary procedures for using that knowledge to inform decision making across sector-specific government policies.

6.3.5 Interaction between resource-based mechanisms and interventions

Another important pattern identified is how the lack of *resource-based mechanisms* is significantly hindering the potential to gain efficiencies and synergies across *FRM and sector-specific interventions*, as highlighted by number 5 in Figure 6-6. The landscape of funding mechanisms is much more limited than observed in the English case study. There are no joint funds available, no examples are identified where funds from different organisations could be merged and there is a general reliance on donor funding to support interventions in FRM. Within the local government and Serbia Water the funding for FRM

infrastructure is limited and is still focused predominantly on recovery from flooding and small maintenance issues, as demonstrated in the following quote;

We don't have big budgets and because of that we can't say ok in this year we will reconstruct every road and river. I have problem you can't say that. You say ok, I will reconstruct this one and this one and hope another is not a problem. Every few years you need to go back to reconstruct the same road you rebuilt a few years ago. Going in circles. You are doing something but not well. When the time comes when we have big budget and to say ok, we are doing this in two years we must do everything. (Urban landscaping representative SB-08)

This lack of funding has resulted in scattered progress on FRM across Serbia, being primarily dependant on donor funding, and an inability to upscale due to weak funding mechanisms. However, the proposed joint fund for the West Morava River Basin, combined with the ability to have cooperation agreements across municipalities (*rule-based mechanism*) offers an opportunity to jointly define and implement interventions for FRM at the river basin scale. The dependence on donor funds, brings uncertainty for the future. Considering the poor economic state of the country it is unlikely that the national budgets will change significantly in the near future, thus becoming as efficient as possible by working on FRM across municipalities is even more necessary. Nevertheless, it is also important to recognise that even if a large amount of funding becomes available (e.g. from donors), it is likely that this would not be spent in the best way, because of limited risk knowledge, plans and skilled staff. The role of the partnerships in enabling joint decision making therefore becomes even more important. This draws an interesting parallel with the local authorities in the Great Ouse RFCC who initially did not know how to spend their funding allocation and needed to develop a pipeline of interventions on FRM across the catchment (CB-09). This indicates that the lack of *resource-based mechanisms* is part of the problem, but that the effects of decades of under-investment in skills and training, may result in slower progress towards FRM integration going forward. The efforts of the DCP to push the boundaries of their staff (e.g. developing websites, sharing data), have built their capacity to understand the key gaps and to be better prepared to spend funding when and if it is available, in contrast to other municipalities who have not built up this capacity. This again demonstrates the scattered levels of progress on the capacity for integration in FRM across different municipalities. Furthermore, this illustrates the likely dependence on international consultants if such capacity is not built within the public or private sector in Serbia.

This raises the further question if the FRM sector in Serbia can capture more opportunities through integration with wider sectors, e.g. economic or environmental, in parallel to the

development of its own sector. This was seen in the department of Urban Landscaping where they are already struggling to fund flood embankments and associated infrastructure, although connecting with other forms of infrastructure under their control (e.g. roads) may be feasible if the funding arrangements allowed it. However, aligning with other sectors such as the environment would prove more difficult to instigate more NFM solutions because the mind-sets of environmental actors on FRM are likely to be lagging behind (nationally and locally). Furthermore, fundamental adjustments of *resources-based mechanisms* to implement joint FRM and sector-specific interventions (e.g. introducing such a Partnership Funding approach as seen in England) are likely to take much more time to establish. Considering the cultural barriers and the familiarity with working in silos, smaller incremental steps are needed to change mind-sets both nationally and locally to strengthen actor relationships to work towards more cross-sectoral integration for FRM.

Overall, this section demonstrated the interactions between the key elements of integration highlighted through the application of the framework.

6.4 Identifying enablers and overcoming barriers to integration in flood risk management

The application of the framework in Serbia represents a situation in which limited integration in FRM has occurred, but where there is a lot of potential for progression in the future - given the new regulations and motivation of individuals - if supporting mechanisms are implemented. For this reason, this application of the framework draws some interesting findings on the following enablers and barriers to achieving higher degrees of integration:

- Cultural barriers for change;
- Distribution of funding;
- Knowledge and skills availability;
- Availability of proactive individuals;
- Underlying factors.

Cultural barriers for change

Given the cultural context in Serbia, whereby actors are used to working in strict silos and in a very hierarchical organisational structure, it was identified that regulatory changes are necessary to initiate progress on FRM within the government. However, as the interviews showed, even when actors are obliged to take responsibility, they can still be reluctant or unaware of their responsibilities, even years after their introduction. This can potentially be explained by a fear of the unknown or of trying something new, resulting in a desire to hold on to previous power/roles or to act in similar ways as before. Such cultural tensions and ‘collaboration fear’ of professionals more familiar with sectoral approaches was similarly identified as a challenge for integration in other studies (Kolkman et al. 2005, Wilkinson et al. 2017).

Another cultural barrier identified is between the government and the public, whereby public behavioural change is required to manage flood risk. Poor practices identified included, dumping waste in the river and building illegally on riversides which increases flood risk. The need for increased dialogue with communities about planning in Serbia was identified by other scholars to build their trust and acceptance of FRM measures and regulations (Ristić et al. 2012, Anđelković and Kovač 2016). Instigating such a change is expected to be a long process, as seen in the English case study whereby challenges on risk communication still persist despite their advancements in FRM.

These cultural barriers have the potential to significantly hinder integration efforts, for example stalling the progress of the West Morava River Basin Partnership or limiting the accessibility of data. This, in turn, could lead to further polarising of actors’ mind-sets, limiting their ability to develop strong relationships that jointly work towards integration in FRM. Aligning such mind-sets between actors and increasing the understanding of their roles is important but is expected to take significant length of time and investment in *resource* and *actor-based mechanisms*. This is especially relevant considering the time that has already passed since the regulations were implemented in 2010. The need for such an amount of time to transition towards a more collaborative working environment, adapting cultural norms and building trust across actors has been recognised by the scholars that promote such collaborative forms of governance, e.g. Emerson et al. (2012) and Vangen and Huxham (2003).

Distribution of funding

Another barrier identified for realising integration in FRM is the distribution of funding between national and local levels. As explained in the previous sections, the distribution of funding to support new responsibilities at the local level was grossly insufficient to enable action on FRM. It is recognised that this is partially due to the lack of capital funding for municipal budgets on FRM due to the poor overall economic situation in Serbia. However, even when considering the funding from donors, this was more skewed to the national level, e.g. prioritising funding of the National Risk Assessment over supporting local risk assessments. This may suggest that it is easier to fund national projects than to fund multiple separate projects in different municipalities in a fair and consistent way. Furthermore, the donor funding is predominately related to the areas that had the most significant flooding, thus offering a ‘window of opportunity’ for resource inflows into specific areas (Birkmann et al. 2010). This focus on flood recovery is still very prominent and although it offers an opportunity to enable improvements in those areas, it also acts as a barrier hindering consistent development across the country resulting in scattered degrees of integration. This is something which is hard to represent in the framework in its current form, unless applied at multiple scales and/or areas. However, the efforts to create the partnership across the West Morava River Basin offer a good opportunity to generate more consistency at the river basin level, to jointly fund knowledge development and interventions.

This application in Serbia demonstrates the lack of recognition of the requirements for local level funding which was found to have the direct knock-on effect of slowing down progress on FRM. In this way, support for national and local level efforts need to happen in parallel. This supports findings of Taylor (2007) who establish that despite responsibilities being pushed down from national level to local government and communities, control is retained at the centre. This was clearly seen by the DCP when they felt that they were given more and more responsibilities but no resources to implement them. This could indicate that distributing more responsibilities locally by national governments is a move to demonstrate that they are taking proactive and concrete steps towards more collaborative localised forms of governance as advocated in the EU directives and the Sendai Framework on DRR. However, in practice they are not actually doing this effectively, failing to provide the supporting resources both nationally and particularly at the local level.

Knowledge and skills availability

Another barrier identified is the limited access to and availability of risk knowledge. The findings suggest that the limited availability and quality of risk knowledge acted as a barrier for additional progress on implementing integrated FRM policies and interventions. Furthermore, this lack of knowledge negatively influenced the ability to develop new rules, such as including risk zones in spatial planning regulations, as identified in the literature and interviews (Vujosevic 2011). Considering the importance of risk knowledge, strong efforts to overcome this barrier were seen in Kraljevo, where strong relationships between the DCP team, their CPCs and PUCs were capitalised on, to collate as much data and information as possible and make it openly accessible. This demonstrates a very proactive step by the DCP to overcome this barrier in combination with a lack of resources. Such collaborative forms of knowledge development are strongly supported by scholars that promote collaborative forms of planning and management (Ridder et al. 2005, van Herk et al. 2011, Evers et al. 2012, Benson et al. 2016). Knowledge is expected to remain of central importance to further progress integration in FRM in Serbia. In particular, this refers to the exchange of knowledge and learning across boundaries, e.g. between municipal DCPs, CPCs or PUCs, facilitated through the support of partnerships at the municipal and West Morava River Basin level. Different municipalities are expected to evolve on their integration journeys in different ways and will have more positively (e.g. motivated individuals) or negatively (e.g. negative culture towards collaboration) influencing factors to deal with along the way. Partnerships therefore offer a crucial means for actors to continuously exchange knowledge, broaden their skills and learn from one another.

Availability of proactive individuals

Despite the above-mentioned barriers to integration, a significant enabler for integration identified in this case study is the role of proactive and determined individuals to initiate and drive action on FRM. This is similar to the findings from the English case study. The proactive nature of the DCP team was key to enabling the progression of *risk knowledge* at the local level, establishing and training the CPCs, and advocating the West Morava River Basin Partnership. Creating a proactive environment and collaborative culture, as seen within the DCP, demonstrates how progress on integration in FRM is possible. However, it also demonstrates how individuals can only achieve so much until more significant changes to the underlying actor-, rule- and resource-based mechanisms are implemented. This

finding is strongly supported by literature on the role of individuals such as - boundary spanners, champions and policy entrepreneurs (Williams 2002, Taylor 2009, Meijerink and Huitema 2010). Chapter 7 delves deeper into this finding.

Underlying factors – economic stability, conflict, multi-hazard

Serbia offers a contrasting case study to England, with a weaker economy, a high dependency on funding from international donors, and conflict and war still being close in memory for the population (UNDP 2016). All these factors limit Serbia's governance capacity for integration in FRM to grow and to realise integration in practice. The FRM system is in a constant state of repair due to the recurring impacts of natural hazards and even when the leadership for change is there, for example seen through the establishment of new rules, the underlying constraints and constant setbacks limit their effectiveness. For this reason, only so much progress on integration in the context of FRM is possible in a short period of time and that uncontrollable barriers will likely get in the way of even the most motivated and determined individuals that are enabling change. Considering this expected slower pace of change, such big changes such as the transfer of responsibilities to the DCP (i.e. *rule-based mechanisms*) are expected to take a long time before the surrounding mechanisms are adjusted and the desired results to realise integration in FRM can be delivered.

6.5 Summary

The application of the framework in Kraljevo Serbia demonstrated the need for long-term commitment to improving the key elements of integration in FRM. Supporting actor- and resource-based mechanisms are particularly needed to facilitate the implementation of the new rule-based mechanisms. The application further highlighted the importance of building and maintaining strong relationships between actors to generate knowledge and to gradually work towards generating joint FRM policies and interventions across sectors at the local and regional level. Although this application demonstrated more barriers than enablers for integration, it did demonstrate the important role of proactive 'boundary spanning' individuals and their influence on integration in FRM, as similarly found in England. This topic is discussed in more detail in the next chapter, followed by Chapter 8 which draws upon the depth, scope and speed of change to characterise different degrees of integration in FRM. This chapter in combination with Chapter 5 answers research question 2.

Chapter 7 Interplay between individual roles and influencing mechanisms for enabling integration in flood risk management

This chapter brings to the forefront the findings on the important ‘boundary spanning’ roles that individuals play in influencing *actor-, rule- and resource-based mechanisms* and how these mechanisms can hinder or enable such roles to achieve integration in FRM. The chapter uses the evidence collected both in Serbia and England across the interviews and meeting observations. As mentioned in Section 3.2.2 a recording of the panel session organised at the Flood and Coast Conference 2019 (PO-25) was used to supplement the evidence for this chapter. Although the topic of individual roles was not initially prominent, its importance emerged during the interviews and therefore gained more focus in the latter stage of the research. The chapter further advances the concept of structure-agency interplay in application to achieving integration for FRM. This chapter answers research question 3: *How do the mechanisms in place enable or hinder individuals’ ability to achieve integration and vice versa?*

7.1 Structure-agency interplay

The interplay between structure (e.g. organisational configuration) and agency (e.g. individual ability to act and exert influence) forms a long-standing theoretical debate within social sciences, where some theorists argue that one is more dominant than the other. However, more recent scholars take a more fluid view, emphasising their intertwined nature, whereby actors determine outcomes but their ability to act is determined by the structured context in which they work (Giddens 1984, Hay 1995, Williams and Sullivan 2009). Similarly, the Policy Arrangements Approach (PAA), used to inform the development of the framework in Chapter 4, also supports this view, such that, structures formed shape subsequent behaviour but such structures are not fixed (Arts et al. 2006). To put structure-

agency interplay into the context of this research on integration in FRM, the structural elements are identified as the *actor-, rule- and resource-based mechanisms*. The individual agency is the ability of individuals to utilise their competencies, skills and personal attributes to exert influence on this structure, but their ability to do so will also depend on this structure – as shown in Figure 7-1.

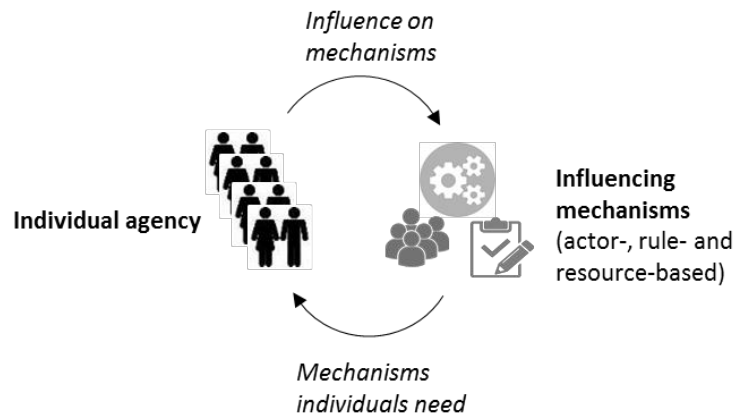


Figure 7-1 Structure-agency interplay as conceptualised in this research

It is also important to note that within the framework, structure and agency overlap within *actor-based mechanisms* (see Section 4.3.2). The actor-based mechanisms (as summarised in Figure 2-4) include coordination or boundary-spanning staff (i.e. representing individual agency) and other *actor-based mechanisms* such as partnerships and training (i.e. representing more structure) which will influence or be influenced by the individual agency. Therefore, for the purpose of this chapter, these individual boundary spanning roles are distinguished from other actor-based mechanisms. In this way, the interaction between individual roles and other *actor-based mechanisms* can be further explored in combination with the *rule-* and *resource-based mechanisms*.

This complex interplay between structure and agency was strongly evident in the findings across both case studies, as similarly identified by Williams and Sullivan (2009) for integration between health and social care. The previous chapters highlighted how individuals were successfully building relationships and breaking down barriers to integration in FRM, often compensating for a lack of *resource-, rule- or actor-based mechanisms*. The following quote from an EA representative captures this well describing how a void of *rule-based mechanisms* puts more reliance on individuals to enable integration for FRM. However, even when the right mechanisms are in place, individuals

still play an important role to implement them. Therefore, highlighting the fundamental importance of individual agency.

At the end of the day it's almost contradictory if you don't have the legislation and the institutional arrangements but you have great individuals things can happen, but then it's generally sporadic and it's very much dependent on the individual, whereas if you have institutional arrangements but you don't have the individuals then it becomes sterile and it's not implemented. (Yorkshire EA representative LD-04)

Furthermore, the forces at play between the influencing mechanisms and individual roles was demonstrated in an interview with the Regional Flood and Coastal Committee Yorkshire chair. He identifies that although *resource-based mechanisms* are not tailored enough to align FRM and economic growth in projects, adding that “*it is getting a lot better, but it often works because of individuals*” (LD-07). This demonstrates how such individuals can ‘fill the gap’ when mechanisms are not functioning. These findings support William’s (2002) argument that the availability of such individuals with collaborative mind-sets and skills play a pivotal role in determining the success of other inter-organisational structures or mechanisms. A similar view was identified in the interview with Network Rail. However, they felt that individuals no matter how motivated they are, could only achieve so much integration, because they are ultimately constrained by *resource-based mechanisms* (e.g. timeline, criteria), as illustrated by the following quote;

It's going to be harder to change if the external culture [i.e. structure] doesn't change because no matter how much you change the internal culture [i.e. individual agency] and it wants to do it, it will always be constrained by the funding process. (Network rail representative N-06)

Overall, these findings demonstrate that individual agency and the influence of *actor-, rule-, and resource-based mechanisms* are mutually important processes, which are dynamically intertwined to influence integration in FRM, a view supported by Giddens (1984) and Williams and Sullivan (2009). This interplay between structure and agency forms an appropriate foundation for this chapter to further explore the roles different individuals play alongside the *actor-, rule-, and resource-based mechanisms* in place to influence integration in FRM. Additionally, insights are provided into the skills and competencies of different individual ‘boundary spanning’ roles and the way these roles evolve for different degrees of integration in FRM.

7.2 Boundary spanning roles

The importance of individuals in enabling action has been well documented in the literature, albeit under different titles. There are studies which highlight the important role of policy entrepreneurs in the water sector (Huitema and Meijerink 2010, Meijerink and Huitema 2010), enabling better coordination across levels for FRM (Dieperink et al. 2016), influencing climate adaptation policy (Tanner et al. 2018) and implementing the Sustainable Development Goals (Mintrom and Thomas 2018). Another type of individual identified is a knowledge broker (Meyer 2010) that connects science and practice to broker knowledge across boundaries e.g. for integrated river basin management (Surridge and Harris 2007). The term ‘champion’ was found to be regularly used to represent a “*tireless, process-savvy organizer and promoter of the change effort*” (Crosby and Bryson 2010 p. 219). Champions were found to play an important role in enabling sustainable urban water management (Taylor 2010, Taylor et al. 2012) and technological innovation (Howell and Higgins 1990). The research of Williams (2002, 2011, 2013, 2009) coins the term ‘boundary spanner’ as a broader term that encompasses different types of individuals “*who have a dedicated role or responsibility, work in a multi-agency and multi-sectoral environment and to engage in boundary spanning activities, processes and practices*” (Williams 2011 p. 27).

Although there are many different names for such individuals or the roles they play, here the individual ‘boundary spanning’ roles typology as identified by Williams (2011) is used – 1) reticulist, 2) entrepreneur, 3) interpreter and 4) organiser. These roles were found to connect well with the breadth of evidence collated from the case studies in England and Serbia. Furthermore, an additional role ‘the specialist’ is added and is explained further in Section 7.3.5. In the context of this research on integration in FRM the five boundary spanning roles are defined as follows:

1. Reticulist: A senior individual with the network, power and perspective to transcend multiple boundaries (e.g. political, geographical) to facilitate integration;
2. Entrepreneur: A creative innovative individual that captures opportunities to support integration across boundaries and empowers others (e.g. aligning interventions across multiple sectors or embracing the role of communities);
3. Interpreter: An individual that acts on the interface to translate across specific boundaries (e.g. disciplinary, sectoral, spatial, administrative or geographic) supporting integration.

4. **Organiser:** An individual that works intensively on administrative tasks (e.g. organising meeting participants, agendas and minutes) to bring people together across boundaries to enable integration;
5. **Specialist:** An individual who has a specialist job (e.g. engineer) but is open and willing to engage across boundaries (e.g. with other disciplines or sectors) to support integration.

Identifying multiple roles is preferred in this research, because often too much emphasis is placed on a specific individual achieving an outcome rather than recognising the breadth of roles that can enable such change (Gronn 1999, Huxham and Vangen 2000b). Furthermore, collaborative governance is recognised for demanding and cultivating multiple leadership roles (Agranoff and McGuire 2003).

7.2.1 Skills and competencies of boundary spanning roles

Here the competencies and personal characteristics of each of the boundary spanning roles are further described in connection with Williams (2011) but also including the added ‘specialist’ role. Overall, these roles offer a distinguished range of competencies as outlined in Table 7-1.

Table 7-1 Boundary spanning roles and competencies (after Williams, 2011)

Reticulist	Entrepreneur	Interpreter	Organiser	Specialist
<ul style="list-style-type: none"> • Networking • Managing multiple accountabilities • Diplomacy and political skills • Communicating 	<ul style="list-style-type: none"> • Brokering • Risk taking • Creativity and innovation • Negotiating 	<ul style="list-style-type: none"> • Building interpersonal relationships • Listening empathising • Framing and sense making • Tolerating diversity • Trust building • Conflict resolution 	<ul style="list-style-type: none"> • Planning • Servicing • Coordinating • Monitoring • Convening 	<ul style="list-style-type: none"> • Thinking laterally • Willingness to engage • Open minded to try new things
Knowledge and experience across multiple sectors/disciplines				
Personal attributes – proactive, passionate and persistent				

Firstly, the *reticulist* role focuses on building a network of inter-personal relationships, possessing political skills to influence actors and agencies with different levels of power

(Williams 2011). This role is similar to ‘executive champion’ (Howell and Higgins 1990), who influences others as a result of their organisational position, allocating resources and securing political support. For example, the Yorkshire RFCC chair was the pro-vice chancellor of York University, and is currently also chair of the EU funding body (responsible for European Structural Investment Funds - ESIF) for York, North Yorkshire and East Riding, and is a member of the North Yorkshire and East Riding Local Enterprise Partnership (LEP) performance group. These connections help him to influence actor relationships and unlock funding, as evidenced by the following quote;

I think the reason I have the role is because it aligns with many of the things I did as a university pro-vice chancellor with an outward-facing remit. So, for example, I’m especially interested in the impact of FCRM local economic growth and resilience. Also, the links with my LEP and ESIF roles help me to identify common interests and opportunities. One of the things that I hope that I have brought to the RFCC is a wider appreciation of the local political landscape and how best to align with their perspectives. (Yorkshire RFCC chair LD-07)

Next, the *entrepreneur* role focuses on making things happen, bringing new ideas, taking risks and proactively utilising ‘windows of opportunity’ (Williams 2011). This role strongly aligns with competencies of the ‘project champion’ (Howell and Higgins 1990, Taylor et al. 2011) who promotes innovation and experimentation and relies on personal forms of influence to exert influence. The role of the entrepreneur was clearly identified across both case studies, particularly amongst managerial roles in FRM e.g. LLFA flood risk managers and DCP head in Serbia. Overall, the roles expressed abilities to be innovative and think outside the box. For example, the flood risk manager at Leeds LLFA was observed expressing the importance of being creative to overcome challenges hindering multi-benefit FRM schemes, challenging the audience to “*think about things differently and things can happen – although it’s a big challenge - go and challenge the flexibility*” during the CIWEM conference (PO-11). Similarly, in Serbia the head of DCP demonstrated his desire to take risks and test new ideas but recognising that they will not always work out as expected.

It was just intuition. Ok I have idea, let’s go. Some of the ideas were terrible, ha-ha, I was like ok that was not good. One defeat is not a problem. (Department head DCP SB-01)

The *interpreter* role focuses on initiating and sustaining effective interpersonal relationships through listening and empathising with multiple interests utilising their proficiency in different professional ‘languages’ to build collective action (Williams 2011). The findings showed that the ability to frame flood risk across other disciplines is an essential skill for such an interpreter to help other sector-specific actors to understand how flood risk applies

to them (LD-02; PO-25; VE-07). This is evidenced in the following quote by the strategic growth advisor in the Anglian region and additionally by a CIRIA representative;

So rather than counting it [FRM] as an environmental constraint we are counting it as an economic opportunity. That is what pushes the buttons of the people that we are talking to. Working out what those buttons of those people that you are talking to has to be your starting point whether that's in the community or with young people, its understanding what's relevant to them and then how flood risk applies to it. (Strategic growth advisor, panellist PO-25).

Make sure that you put yourselves in the shoes of the organisation that you are trying to engage with, so you understand their drivers, their finances, so you understand where is going to be the 'hook' for them. (CIRIA representative VE-06)

The *organiser* role focuses on organising, planning, coordinating and servicing the collaborative machinery (Williams 2011). This was found to relate to the secretarial and administrative staff managing partnership agendas, invitations and minutes (e.g. LRF, RFCCs). Although this role is less significant in terms of skillset requirements for enabling integration in FRM, than the entrepreneur and interpreter, strong communication skills were found to be important to increase their ability to strengthen *actor relationships* and manage associated partnerships.

As explained, these four boundaries spanning roles identified by Williams (2011) fits well with the data collected in both case studies on integration in the context of FRM. However, an additional important boundary spanning role was also identified specifically for those who work as full-time *specialists* (e.g. drainage engineers, planners) but are likely to work in interdisciplinary environments. Although Williams (2013) concludes that everyone does not need to play a boundary spanning role as part of their job, here it is argued that in the context of FRM, that specific specialist jobs need to interact with other FRM or sector-specific professionals to enable integration. The critical skills identified are the willingness to think laterally and be open to new ideas instead of traditional ones, as shown in Table 7-1. This is especially true for the early career generation to learn and for the older generation to be willing to 'step outside of their ways' and be more open to new ideas (VE-06; VE-02). Others identify this profile as 'T-shaped' whereby individuals are specialists in their own discipline, but able to look beyond it (Brown et al. 2015). Examples are as follows: highway drainage engineers being open to using more SuDS features, or junior engineering consultants being able to "*step back and think broadly*" about the flood risk problem (PO-25). At the Flood and Coast panel session another panellist strongly encouraged the young participants, many of whom were early career engineers, "*not to lose that lateral thinking – not to get sucked into silos and think – actually yes – there are better ways to do this, let's*

keep collaborating.” (PO-25). This demonstrates the general desire for specialist staff to also engage in collaboration even if they do not have a dedicated role to do so. Furthermore, these specialist boundary spanning roles are particularly important where there are no dedicated boundary spanning roles in place (e.g. interpreter). Therefore, the specialists need to bridge the gap without an intermediary role, as shown in Figure 7-2.

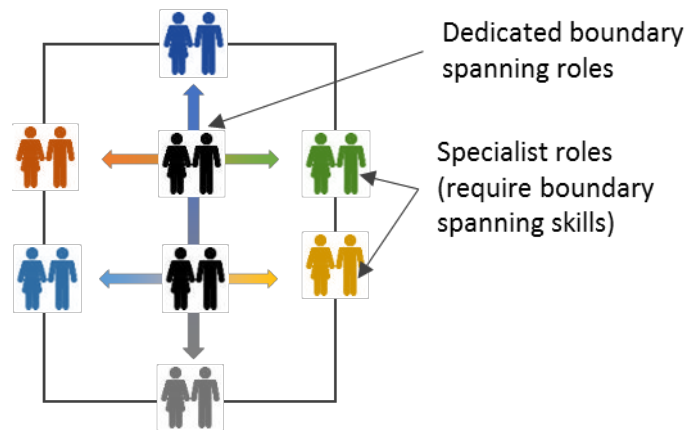


Figure 7-2 Interaction between the specialist and other boundary spanning roles

7.2.2 Personal attributes of boundary spanning roles

The personal attributes of individuals influence their ability to act effectively within boundary spanning roles, as noted in Table 7-1. The personal attributes identified across the case studies included; proactive attitude, passion and motivation to tackle challenges and persistence and commitment to finish them. Other researchers capture similar points in relation to transformational leadership qualities of individuals e.g. enthusiasm and confidence, providing inspiration and motivation to others and persistence (Bass 1999, Hay 2006, Taylor et al. 2011). Similarly, Williams (2011) identifies moral soundness, commitment, enthusiastic work ethic and warm likable personality as important personal traits.

Firstly, the *proactive attitude* was identified in many individuals, especially those who stepped beyond their formal roles into boundary spanning roles e.g. DCP head Serbia and the RFCC chair in Yorkshire. It was found to be strongly linked to one’s own ambition and willingness to engage and lead, making it possible to achieve collaborative working at any stage in your career, as illustrated by the strategic growth advisor;

I think basically the challenge is that if you are willing to do it, you will do it, whatever level you are at [within an organisation]. (Strategic growth advisor, panellist PO-25)

Secondly, *passion and motivation* along with the ability to share that motivation was found to be important to drive partnership working for FRM. The flood partnerships manager at Anglian Water, demonstrates how much passionate motivated individuals are needed to kick-start the growth of relationships across sectors and encourage additional learning outside of your comfort zone;

I think it does boil down to the individual sometimes if you are really passionate to get out and talk to other people, then you will get more out of it than if you sit at your desk and wait for your manager to tell you to talk to that person. (Anglian Water flood partnerships manager, panellist PO-25)

Additionally, for example, the head of the DCP demonstrated strong motivation and enthusiasm towards others, inspiring them to work hard for improvements, both within the DCP and with the CPCs. In doing so he helped to build a spirit of collaboration as highlighted in the following quote and similarly recognised by Hay (2006);

They [DCP team] have been infected by [head of DCP] enthusiasm as well. It is him who keeps all of us [CPCs] together. (Civil protection commissioner SB-17)

Thirdly, *persistence and commitment* were identified across the boundary spanning roles, where individuals expressed determination to keep going and not give up, even if only small progress is made. For example, the progress on implementing the Law on Emergency Situations (LES) in Kraljevo was widely recognised by partners thus driving their continuous commitment to implementation even under difficult conditions (SB-01; SB-07).

An additional trait that was identified in the literature is moral soundness – respect, openness, honesty, and ensuring that exclusive personal relationships do not develop (Hay 2006, Williams 2011). Positive work moral and ethics were identified in the findings, especially for those going over and above their job descriptions, as shown in Serbia;

He [head of DCP] is a rare example of people and the way you are supposed to do your daily job. He is great. (Serbia Water representative SB-04)

Additionally, the literature was found to recognise the possible negative side of such leaders, for example those who take advantage of their roles to focus on their own self-interests (Hay 2006). Although this was not strongly evident in the data collected, the following quote demonstrates that it is possible for some people to focus on self-interests in the context of FRM.

There are some people out there that really make a big difference. Then there are others doing it as an ego trip. (LLFA representative VE-01)

Overall, these personal attributes are important for all roles, however, to a lesser extent for the organiser and specialist roles. The next section describes in more detail the influence boundary spanning roles have on actor-, rule-, and resource-based mechanisms.

7.3 Influence of boundary spanning roles on mechanisms

The boundary spanning roles were found to enable integration through positively influencing a combination of *actor*, *rule*-, and *resource-based mechanisms* to ultimately help unlock opportunities to realise integration in FRM through knowledge, policies and interventions. To demonstrate these influences on integration and contribute specifically to the ‘structure-agency’ debate, here the influence specifically on mechanisms is the focus rather than the other elements of integration. Figure 7-3 aims to simplify the dominant connections identified between the roles and the *actor*-, *rule*-, and *resource-based mechanisms* but does not preclude possible connections between other roles and mechanisms.

Overall, the findings within this research showed that reticulist roles have more influence on *resource-based mechanisms* because they could strategically use their network to explore funding possibilities. Entrepreneurs were found to work creatively to break down the barriers presented by existing *rule*- and *resource-based mechanisms* and to drive the implementation of any new mechanisms required. Interpreters were found to work within existing *actor*- and *resource-based mechanisms* to translate ‘languages’ across sectors and professions to enable joint outputs for FRM. Across the cases, the organisers were found to work within existing *actor mechanisms* e.g. partnerships, to maintain relationships amongst actors. The specialist role was not identified to directly influence the mechanisms; however, it could do so indirectly. Further details on these roles are presented within this section, followed with a brief reflection on the interaction between the roles.

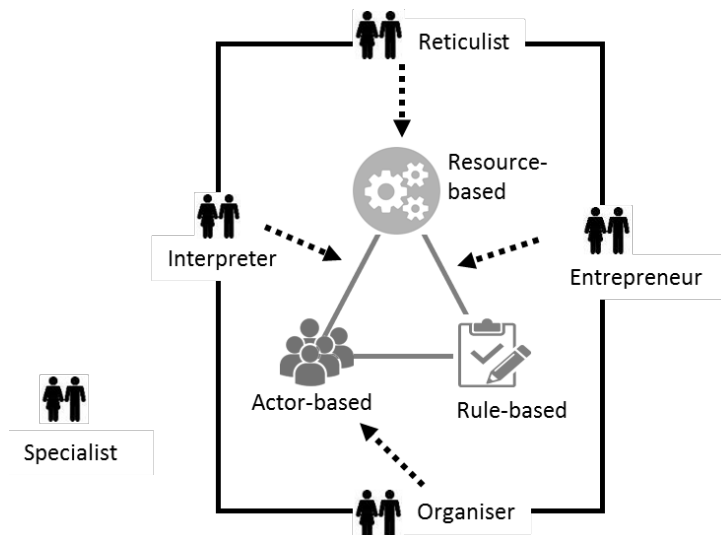


Figure 7-3 Interplay between actor-, rule-, and resource-based mechanisms and boundary spanning roles

7.3.1 Reticulist ↔ resource-based mechanisms

The reticulist role was clearly evident in individuals in the English and Serbian case studies. In particular, this role was found to be connected to some partnership chairs, as shown evidently in the interview with a RFCC chair (LD-07). The RFCC chairs acted as ‘outsiders’ that could view the FRM system as a whole from an external perspective, question the ‘normal’ and bring cross-sectoral knowledge to FRM. To some extent this is by-design in the selection of the RFCC chairs although it will vary from region to region. For example, their previous connections and networks built through their career will span multiple sectors and have developed their diplomatic and political skills. Furthermore, as the RFCC chair role is part time, they will likely have other commitments chairing or be members of other partnerships (e.g. Yorkshire RFCC chair). This demonstrates their large network and ability to maximise the use of it, especially to influence actor relationships and access to *resource-based mechanisms*. For example, the chair introduced the Communities and Local Government team working on the ESIF funds to the EA team to help them get to know each other informally.

A very small thing, in Lateral [the EA regional offices] the Communities and Local Government team are in the same building and on the same floor as many of the EA and they don’t always know each other. Once or twice, I have introduced them to each other, and we’ve made real progress informally by understanding each other’s agenda. (Yorkshire RFCC chair LD-07)

The strong communication skills were also evident in their commitment to joining local FRM partnership meetings (which the members of the RFCC usually chair), adding “*some*

real weight to the discussion” (LD-03). Furthermore, their approach to chairing managed to avoid conflicts between different members, as evidenced in the following quote;

My style of chairing is a bit relaxed, but I think it encourages them to work with each other. I’ve not seen any frictions particularly east Yorkshire has been brilliant where you have two authorities there within the partnership, East Riding Council and Hull who often have real tension because of their boundaries. (Yorkshire RFCC chair LD-07)

However, not all partnership chairs will have the same personal attributes, ability to enable inclusive multi-stakeholder dialogue and transcend political differences (CB-16). Therefore, someone playing a reticulist role, but poorly, can have a negative effect on building actor relationships and thus integration in FRM.

Other examples identified of the reticulist role included the director of the Public Investment Management Office (PIMO) in Serbia and the chair of the Standing Conference on Towns and Municipalities (SCTM). However, these individuals were not interviewed but were referred to by other interviewees as being a powerful force in supporting the efforts on the West Morava River Basin cooperation agreements and partnership (*actor- and rule-based mechanisms*) and gaining access to donor funding (*resource-based mechanisms*) for the local level (SB-01; SB-07; SB-11). Furthermore, in England the leadership of the Association of Drainage Authorities (ADA) helped to strengthen relationships between EA and IDBs to enable more partnership working on FRM.

It has evolved in the last 10 – 15 years. [name retracted] started that change in attitudes. [name retracted] got the ball rolling on a different way of working. ... I think the IDB world is reasonably healthy where it sits and feels comfortable in its own skin. It hasn’t always been like that. (ADA representative N-02)

Overall, this reticulist role demonstrates a more top-down approach to exert influence and change (Howell and Higgins 1990, Bass 1999, Hay 2006), however still utilising both formal and informal means to enable integration in FRM.

7.3.2 Entrepreneur ↔ resource and rule-based mechanisms

The entrepreneurs identified were found to express a creative and innovative approach to utilise *resource-based mechanisms* for FRM, such as NFM funding, Growth Fund (via LEPs) or donor funding. For example, the flood risk manager in Leeds LLFA demonstrated creativity and innovation through his work to combine multiple funding sources to implement the Wyke Beck and Leeds Flood Alleviation Schemes (FAS) (LD-02). Additionally, the Partnership and Strategic Overview team at the EA have a dedicated role

to act in an innovative way to capture opportunities for FRM across multiple objectives related to ‘place’.

The PSO officers are there to play that integrating role and to think ‘place’ for us [the Environment Agency]. (National EA representative N-14a)

For example, the LLFA flood risk manager along with the PSO team in Leeds were able to capture the ‘window of opportunity’ that arose from the 2014 floods to access funding to champion green-blue infrastructure and the use of Natural Flood Management (NFM) in place-making – as shown in the following quote;

It’s a few enlightened people, if it wasn’t for [PSO officer] and [LLFA flood risk manager] we wouldn’t be able to have this discussion [on NFM]. (Aire and Calder catchment partnership host LD-03)

These examples chime with other researchers’ findings on the role of entrepreneurs to foresee and capture opportunities for change, and knowing the right time to act (Meijerink and Huitema 2010). Additionally, the partnership hosts for some catchment partnerships were identified as having entrepreneurial roles influencing *resource-based mechanisms*. However, some also showed signs of playing the interpreter and/or reticulist role. For example, as discussed in Section 5.1.3, the Aire and Calder catchment partnership and the Nene Valley partnership hosts are members of their respective RFCCs and can influence the prioritisation of environmental objectives and advocate funding for multi-benefit schemes (LD-03; CB-16). Another example of an entrepreneur influencing *resource-based mechanisms* is the regional FRM coordinator for Anglian Water who helped to negotiate joint funding from the water company for flood schemes and brokers knowledge and priorities from both sides.

Fantastic things happening [with Anglian Water] but not by design but they are happening because of innovative individuals who don’t take no for an answer, who push push push. (Nene Valley catchment partnership host CB-16)

Similarly, for the implementation of SuDS, one interviewee recognised the important entrepreneurial role of such ‘champions’ because the *resource-* and *rule-based mechanisms* are weak.

The regulation is so poor, the funding pots are so diminished, the role of these champions in delivering these outcomes is really important. (CIRIA representative VE-06)

In Serbia, the head of the DCP was identified to relate strongly to the role of the entrepreneur. As less funding is generally available in Serbia, the entrepreneur role was found to be proactive in building relationships with donor agencies and accessing in-kind

donations where possible to support the DCP team and CPCs. They were also found to play a crucial role in adapting and implementing the *rule-based mechanisms*. For example, successfully advocating for changes in legal arrangements to make collaboration easier through amending the law on local self-governments and resulting cooperation agreements (SB-01, SB-07). Their role expressed determination to create strong relationships between actors to work towards a shared vision for FRM and DRR.

We can do it. Why? Because we know each other, we have that kind of trust. If you don't have trust between institutions, between people, between citizens you are not going to do anything you know. Maybe you are going to have beautiful paper, but nothing else. (Department head DCP SB-01)

Additionally, members of the DCP team were found to act as entrepreneurs. They identified problems and developed new innovative ideas e.g. using Google Earth to show risk maps and critically questioning ideas (SB-15). However, these individuals, although they may not have all the knowledge to put ideas into practice, they are willing to try using whatever resources they can – as illustrated in the following quote;

On the other hand, you have people that are willing to do everything, but they don't have adequate knowledge, 'Ok I'm going to do this, how? Doesn't matter, I'm going to do it.' My colleagues are like that. (Department head DCP SB-01)

This demonstrates the role of the entrepreneur to encourage such innovation and creativity from the team as a whole, not just by themselves, as recognised by Hay (2006). Furthermore, in both case studies the influence of entrepreneurs on *actor-based mechanisms* was also identified. For example, the DCP was effective at running training sessions with CPCs and working towards the establishment of the West Morava River Basin Partnership.

In everything they do and the equipment they receive and the activities happening right now on Rudno [training centre] it's all because of [head of DCP] enthusiasm and his personal connections in Belgrade. (DCP staff member SB-17)

Therefore, this entrepreneurial role demonstrates possible influences on all types of mechanisms to influence integration in FRM. As described by a manager at the EA in the Great Ouse catchment region “*an innovative mind set is different to an innovative technology but no less effective*” (CB-01). This shows that the important competency of such entrepreneurs is their willingness and ability to try things differently. In both case studies strong evidence of these competencies was found in managerial positions related to FRM. However, it cannot be said that every person, that has a managerial role in FRM will identify with all the competencies of the entrepreneur role, it is more representative of those that take the step beyond their formal duties.

7.3.3 Interpreter ↔ actor and resource-based mechanisms

The role of the interpreter was clearly identified in both case studies, however, more poignant examples existed in the English case study because resources were specifically invested into generating these dedicated roles rather than it being an ‘add-on’ role. The interpreter roles were identified to strongly influence *resource-* and *actor-based mechanisms*. In England, many interpreter roles identified were those that received funding from the local levy (approved by the RFCC). For example, a flood risk partnership manager, hired at Anglian Water, to support LLFAs, EA and other RMAs to identify joint opportunities, such as proposing £15 million in Partnership Funding (PO-25, July 2019). Furthermore, this interpreter role in combination with others was found to influence *resource-based mechanisms*. For example, forming a collective voice to influence the funding mechanisms for managing surface water flood risk.

Also, a challenge I found, the current funding mechanisms for surface water need to be tweaked, and it’s not right at the moment. We are working in partnership with colleagues to see what we can do about that. Our programme makes some of those schemes more viable which is really good.
(Anglian Water flood partnerships manager PO-25)

Furthermore, this interpreter role was also found to influence the establishment of the LLFA regional network led by Anglian Water and to enable dialogue between actors to resolve local issues, thus influencing *actor-based mechanisms*. Another interpreter role funded by the local levy, is the Strategic Growth Advisor, based at the EA, who proactively builds relationships between Local Planning Authorities (LPA) and other RMAs to influence joint knowledge, planning and interventions for FRM and housing growth. This role is recognised as being especially important in the Anglian region to capture the opportunities that come with building a huge growth corridor – Oxford-Cambridge Arc (N-11).

Other examples of such interpreter roles were found in the West Yorkshire Combined Authority (WYCA) where they made a ‘flood focal point’ role for an individual alongside their other tasks. This was found to be an important role for building relationships across the Combined Authority, LEP and the RMAs. However, the cross-cutting boundaries make it tedious and complex, indicating that “*it takes up a lot of time*” (LD-05) alongside their other role. Another example is a partnership liaison for a specific route at Network Rail, where the interpreter helps to build relationships, maximise synergies across flood and transport infrastructure. Their importance in strengthening the relationship with the EA is demonstrated in the following quote;

You could see what a key role he [individual at Network Rail] was playing. Actually, when I checked it out with our [EA] view of Network Rail, would you like, our intel, definitely ... his patch was seen as the easiest to work with and very 'can do' and it came down to this individual that recognised the risks and issues that the network faced but was willing to work differently to secure those relationships and get people aligned to work locally. (EA national representative N-14a)

Furthermore, it was identified that in some areas the local levy funding is being used to fund individuals to support community engagement work (N-14a; VE-06; N-15). These individuals (or more neutral facilitators), as highlighted in Section 5.1.1, can develop or work closely with Flood Action Groups to generate joint FRM knowledge, policies and interventions.

In contrast to England, no dedicated interpreter roles were identified in Serbia to interface between specific sectors e.g. for the water sector or planning. However, the DCP staff did demonstrate characteristics of interpreters by working with other sectors to collect data from public utility companies and by working closely with CPCs. This gap in interpreter roles is likely due to the need for the entrepreneurs to advocate for such positions and unlock funding, especially moving forward with the West Morava River Basin Partnership.

7.3.4 Organiser ↔ actor-based mechanisms

The role of the organiser was identified in both case studies. In England, this role fit well with the partnership coordinators or secretariat positions e.g. RFCC secretariat, West Yorkshire FRM Partnership secretariat hired by the EA, or the Local Resilience Forum secretariat. The organiser role is different to the chair as they are supporting the administration behind the partnership or project rather than the strategic direction. However, their role was found to be critical in building actor relationships and acting as the administrative glue to hold the partnerships together (*actor-based mechanisms*). This role can help the partnerships to run seamlessly if time is dedicated to it, however, if tagged along with other roles, it can result in a negative impact on *actor-based mechanisms* and actor relationships. For example, for the local FRM partnership in Cambridgeshire, it is part of a member of staff's role at the LLFA. Therefore, this role can easily become encroached with other roles, as the time commitment for preparing, running and following up after meetings can be underestimated. However, it was found to be a role that is easily accepted as 'required' for a partnership to function. For example, the organiser role is the only one funded jointly from the Local Resilience Forum funds (CB-11; LD-10). Furthermore, in Serbia, one of the DCP team members was found to previously have an organiser role within

the City Emergency Headquarters which helped them to gain the knowledge and network to emerge into more of an interpreter and entrepreneurial role (SB-16). This indicates that this role can be a good entry point to gain boundary spanning experience.

7.3.5 Specialist

Within this research on integration in FRM, the specialist boundary spanning role was identified as an important role alongside the other four boundary spanning roles recognised by Williams (2011). Highlighting this boundary spanning role aims to emphasise how specialists from different disciplines directly or indirectly connected to FRM need to learn skills on how to collaborate, even if not strictly part of their job description. The specialist role is not expected to have any direct influence on the mechanisms; however, it is expected to have an influence on the actor-relationships and their ability to generate joint knowledge. This is particularly important for integration challenges that need to combine disciplinary skills to support FRM e.g. NFM and SuDS, as highlighted in Section 5.1.3. However, traditionally discipline focused technical specialists (such as engineers) are less familiar with working in collaboration due to their training. As such, often favouring traditional approaches to FRM solutions instead of more integrated ones, as demonstrated in the following quote;

‘I know I can make this work by throwing concrete at it or I can achieve the same effect by doing some interesting green areas in the city. I’m going to do the concrete because I know it works and it’s easy and it’s what I’m trained for.’ That’s why NFM was so slow, flood engineers, like throwing concrete at things. (Aire and Calder catchment partnership host LD-03)

Furthermore, one LLFA representative described how some technical specialists can find it more difficult to interact at partnership meetings where you need “*to consciously go out of your way to talk to different people.*” (VE-01). This demonstrates that an additional skillset is needed for technical specialists to step outside their comfort zone and interact. Therefore, indicating that there is a role for each of the specialists themselves to learn how to collaborate and generate a willingness to engage. This role is not expected to be significant enough to influence the actor-, rule- or resource-based mechanisms without the support of other boundary spanning roles. However, the specialist role can influence the joint knowledge produced to support integration in FRM.

7.3.6 Interaction between roles for integration in flood risk management

Table 7-2 summarises the examples of the five different roles identified through the case studies and outlines their influence on different *resource-*, *rule-* and other *actor-based mechanisms*. The findings indicate that all roles are necessary to enable integration in FRM, however, some particular roles are more important or prominent at different degrees of integration. In Serbia with a lower degree of integration in FRM, the entrepreneurial role was crucial for mobilising integration efforts in the absence of *resource-based mechanisms*, but also for implementing new mechanisms e.g. *rule-based mechanisms*. Therefore, in the Serbia case, it is very unlikely that they could have achieved what they did so far without the individuals that stepped into these entrepreneurial roles. Furthermore, at this lower degree of integration, blurred boundaries were identified between these roles and specific individuals. Therefore, individuals played multiple roles to compensate for a lack of resources to hire more staff for dedicated roles. An example of this is how, the head of DCP showed signs of the interpreter, entrepreneurial and reticulist roles. Therefore, one individual can have multiple boundary spanning roles, however, it is likely to be more effective and efficient if they are more dedicated to one and are supported by others.

In the English case study, all roles demonstrated significance for achieving integration in FRM, and worked well in combination to strengthen partnerships, unlock resources and ultimately generate joint knowledge and deliver interventions for FRM. However, considering the higher degree of integration for FRM in England, an interesting development is the role of the interpreter. This role was found to have a particular importance moving forward to influence integration with more challenging sectors (e.g. housing and infrastructure growth) to build bridging relationships and to maintain and further strengthen the recently developed *bonding relationships* (e.g. water companies). Therefore, this demonstrates that progress on integration in FRM in both cases would have been very difficult to achieve without these boundary spanning roles.

Table 7-2 Overview of boundary spanning roles and their influence on mechanisms for integration

Role	Examples identified across case studies	Influence on mechanisms
Reticulist	<p><i>Partnership or committee chairs</i></p> <ul style="list-style-type: none"> • RFCC Chairs • Other (independent) chairs of partnerships/committees • PIMO director and SCTM chair (Serbia) 	<ul style="list-style-type: none"> • <i>Resource-based</i> – gaining political support to access resources • <i>Actor-based</i> - increasing the impact of partnerships they chair e.g. reducing conflicts
Entrepreneur	<p><i>Managers</i></p> <ul style="list-style-type: none"> • Flood risk managers (Lead Local Flood Authorities) • Partnership and Strategic Overview officers (Environment Agency) • Regional flood risk managers (Water Companies) • Catchment Partnership hosts • Department of Civil Protection manager (Serbia) 	<ul style="list-style-type: none"> • <i>Resource-based</i> - accessing funds from different sectors e.g. water, growth. • <i>Rule-based</i> - influencing the adjustment of rules e.g. inter-municipal cooperation agreements. • <i>Actor-based</i> - influencing training/capacity building activities e.g. SCRIMP Leeds and training a team.
Interpreter	<p><i>Liaisons/ advisors</i></p> <ul style="list-style-type: none"> • Flood partnership managers (water companies) • Strategic growth advisor (EA/LLFAs) • Combined Authority and Network rail flood liaisons • Catchment coordinators (EA)/ PACM coordinator • Community engagement facilitators • Staff in DCP (Serbia) 	<ul style="list-style-type: none"> • <i>Actor-based</i> - strengthening actor relationships through actor-based mechanisms. Organising additional meetings/events. Bilateral exchanges with actors. • <i>Resource-based</i> - identifying potential funding opportunities and means to overcome ‘strings’. Identifying the gaps e.g. surface water funding in Partnership Funding.
Organiser	<p><i>Partnership coordinators / secretariats</i></p> <ul style="list-style-type: none"> • Local FRM partnership coordinators • Local Resilience Forum secretariat • RFCC secretary 	<ul style="list-style-type: none"> • <i>Actor-based</i> - continuity/functioning of partnerships and other associated meetings.
Specialist	<ul style="list-style-type: none"> • Drainage engineers e.g. highway authority, consultants • Planners e.g. local planning authority • Water managers/engineers e.g. IDBs 	<ul style="list-style-type: none"> • Indirect influence on mechanisms. • Direct influence on knowledge development.

7.4 Mechanisms influence on boundary spanning roles

This section discusses the other side of the structure-agency debate by delving deeper into the influence that the availability and/or quality of different *actor*-, *rule*-, and *resource*-based mechanisms have on generating, training and sustaining such boundary spanning roles. It was identified that *resource-based mechanisms* play an important part in generating such roles, along with the flexibility of *rule-based mechanisms*. However, investment in *actor-based mechanisms* is fundamental for building and maintaining boundary spanning skills, and similarly for ensuring the long-term continuity and presence of boundary spanning roles to support integration in FRM – as illustrated in Figure 7-4. It is important to track the contribution that these boundary spanning roles make to enable integration through improving the governance capacity for integration or realising it in FRM practice.

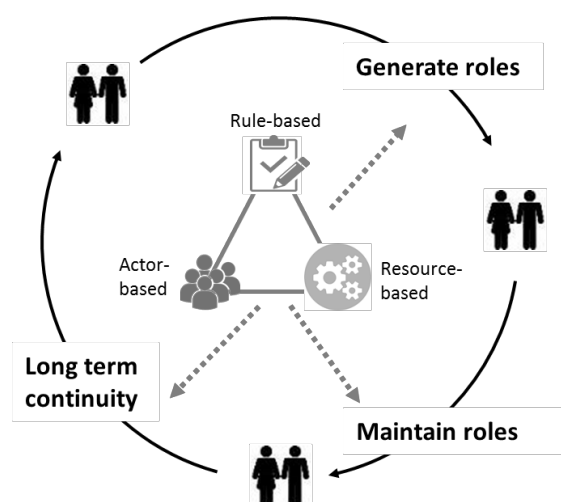


Figure 7-4 Interaction between influencing mechanisms and boundary spanning roles

7.4.1 Generate roles

Funding availability for roles (resource-based mechanisms)

Firstly, the availability of resources to hire individuals to fulfil these roles is fundamental to generate them. For the entrepreneurial boundary spanning roles, these were found to be mainly embedded in existing managerial roles, and thus did not necessarily need new dedicated funds. However, although these managers have an embedded role in leadership and management, they do not necessarily have boundary spanning skills. Therefore, they need to choose to engage in those behaviours, acting more of an ‘emergent’ leader as recognised by Howell and Higgins (1990). The following quote demonstrates how quickly

the envisioned role of the LLFA flood risk manager can change and how they need to have boundary spanning skills to capture emerging opportunities for integration in FRM;

I think that the flood risk manager from 5 years ago would be lost in the sea of opportunities that there is now around other benefits linked to flood risk and the opportunities to find different hooks and drivers for getting an outcome but making sure that interventions also deliver on other aspects. (CIRIA representative VE-06)

This quote indicates the importance of careful recruitment when selecting individuals for these roles in order to get the people with the right attitude and personal traits (Williams 2011) who can adapt to changing needs for integration in FRM. These findings support research by Hartmann and Driessen (2017) that suggest a new type of flood risk manager is needed that can understand both the technical aspects and can manage the surrounding discourses across sectors.

Other examples of funded individuals were for co-ordination boundary spanning roles e.g. the LRF joint fund for a secretariat. Additionally, in the Yorkshire region a specific coordination secretariat position was made available at the EA to act as the bridge between the Yorkshire RFCC and the West Yorkshire FRM partnership. This was deemed necessary as Yorkshire have an extra layer of regional FRM partnerships on top of those led by county and city councils (LD-01). However, in Cumbria, the EA and LLFAs co-funded coordination positions for all four local (county/city level) FRM partnerships, again to draw the connections between the RFCC and local FRM partnerships. However, primarily it was identified that this organiser role was linked with an existing role of mid-level staff e.g. Cambridgeshire LLFA. Therefore, these roles can be ‘tagged on’ to a pre-existing staff role until it conflicts with their regular work or until funding is available for new role.

For the interpreter role, the local levy was found to be a useful resource-based mechanism to jointly fund these individuals e.g. strategic growth advisor, Anglian Water flood risk partnerships coordinator. However, a challenge identified is the difficulty to use *resource-based mechanisms* for staff, especially specialists with the LLFA teams in England and DCP team in Serbia. For example, in Leeds LLFA, the flood risk manager has now been able to expand his team, including seven new members of staff (VE-04). To do this, he had to increase the portfolio of projects to justify spending on staff because they previously had to rely on consultants (VE-04). In comparison, sector-specific actors e.g. Network Rail were generally found to generate these roles based on the motivation of individuals to do so.

We don't have a network out in the business of dedicated or mandated or appointed people. [...] At the moment in a way they are goodwill contacts. They are people who have picked it up of their own back because they think they should. It varies across the routes. Some said that 'you will do it' because they think it's important but other routes have engaged less. (Network rail national representative, N09)

However, although this may initiate boundary spanning roles, it is unlikely to last long-term and will always be inconsistent because of an already overloaded job profile. Therefore, more institutionalised ways are needed to ensure these interpreter roles are generated (like the local levy funded positions), as evidenced by the following quote;

This [local levy fund] is a really good example of institutionalised champions. This dispels the theory that things happen because there is an individual that drags it, which is true, but you can create this individual. There is a shortage of people who are interested in doing this. You need to have your company willing to fund it. (National Infrastructure Commission representative VE-02b)

Considering these insights, it is clear that investment is needed to generate these boundary spanning roles to ensure their ability to capture opportunities for integration in FRM.

Funding and recruitment rules (rule-based mechanisms)

Although, the local levy was recognised as acting as a useful tool to hire specific interpreter roles, some barriers were also identified. For example, it cannot fund staff that are needed to deliver statutory duties – it needs to be 'something extra'. Therefore, the strategic planning advisor and flood risk partnerships advisor (at Anglian Water) roles are not strictly necessary, they just help to enable better joint outcomes for FRM (PO-25, N14a). After the role being jointly funded by the local levy and Anglian Water, it is now fully funded by Anglian Water highlighting the added value. Furthermore, it was identified that getting the RFCC members to agree on how to spend this local levy took some persuasion to see the value of such an interpreter role;

It is area specific, but there was quite a bit a debate a number of years ago as to whether local levy should be spent on people rather than on projects and then buying people in as part of the projects. (National EA representative N-14a)

It was observed during one Anglian Great Ouse RFCC (PO-2) meeting where there were discussions over the proposals made to hire individuals to work on preparing a pipeline of projects (something which other RFCCs e.g. Thames have approved 10 roles for this). Concerns were raised over how to scrutinise and evaluate whether the roles were successful. The need for the extra posts was argued by EA given the high number of IDBs in their area calling for more partnership working. Other members of the committee, in support explained that this had been a successful approach in other regions and that only having two

posts is spreading it thin. However, some RFCC members were not convinced adding that “*this is £100,000 that could be spent on schemes not people*” (PO-2). This quote indicates that approving spend on people can require a mind-set change for those who are used to spending money on projects. However, despite the reticence the proposal was approved, and a member of staff was hired through the EA. This suggests the need to document and evaluate the benefits of such roles to help convince actors of the benefits. Furthermore, it demonstrates the culture shift that is needed between actors across organisations to recognise these roles.

I think it's confusing for people because it's [staff positions] being paid by the local levy. I think there was also an assumption that the local levy is used for capital works rather than feasibility studies. I think that is a transition and I think people are still trying to get used to that. (CIRIA representative VE-06)

These findings indicate that to generate these roles sufficient flexibility needs to be built within existing funding mechanisms to facilitate that, which is only starting to happen now with the local levy fund. This suggests that the old formal rules are still getting in the way of the shift towards more collaborative governance, as identified by Taylor (2007). However, unless the benefits can be demonstrated, it is difficult to convince everyone of the need. This is also expected to be different for different generations, where younger generations are more accepting and understanding of the value of collaborative working, in comparison to older generations more accustomed to working in traditional silos, as identified in the Serbia case study. The English case study also highlighted the enthusiasm of young professionals to engage in such a collaborative way of working (PO-25). Some additional constraints were identified about which organisation the individual could be formally hired from given the joint funding e.g. LLFAs, EA. In the case of the strategic growth advisor role, there was interest by a local authority to host the role, but this was not allowed, it had to be hosted by the EA (CB-17). This challenge was also identified in Northumbria where they did manage to have the staff member based at the LLFA office but employed by the EA. However, further human resources rule-based challenges persist, as evidenced by the following quote;

This mix has been quite difficult because of internal rules within the EA about who can work where and who is paid by who and rules on what you can pay levy on. ... The logic says – why should this matter but the rules dictate that you have to thread carefully around it. Then you employ them for a year and then find that they become permanent employees and that causes problems because the levy is voted on each year so if the levy decides they don't pay them anymore, who pays the redundancy. (RFCC representative VE-05)

Education and training that develops interest in roles (actor-based mechanisms)

Furthermore, despite the dependence on resources these boundary spanning roles cannot be hired if people with the relevant skills are not available. Therefore, generating these roles requires individuals to gain some of the skills and personal attributes (as outlined in Section 7.2) before embarking on such a role. However, these skills and competencies can be developed at different stages in education and professional careers. Therefore, different mechanisms can target school level, university (or college) level and professional stages in careers, as summarised in Figure 7-5 and discussed herein.

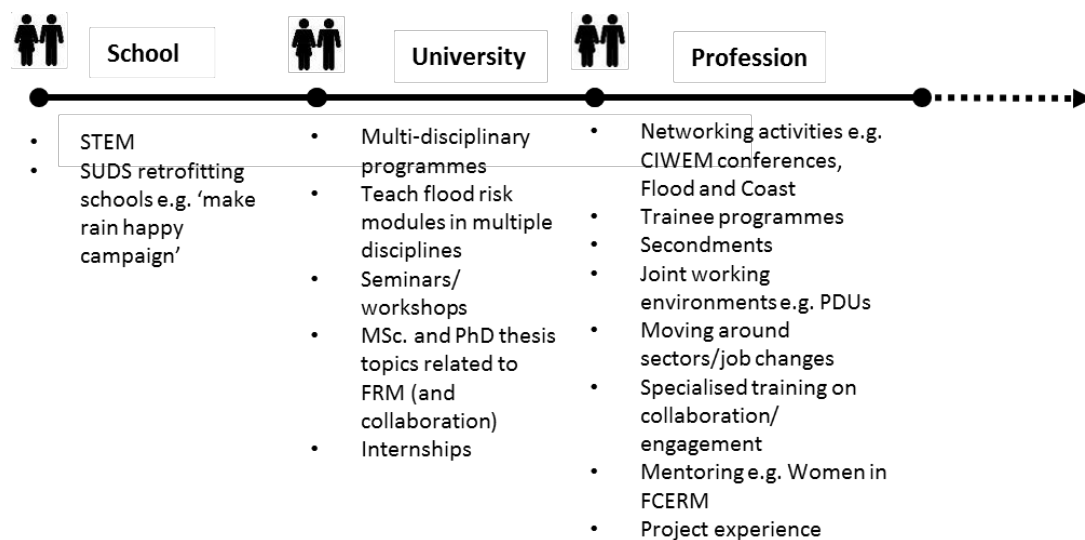


Figure 7-5 Overview of identified actor-based mechanisms to build boundary spanning skills

Although, the interviews did not focus on school and university education, some points emerged from the panel session (PO-25), that these skills need to begin developing as soon as possible in an individual's education. At school level it is important to empower and motivate individuals to enter into careers from multiple disciplines related to FRM. Aside from encouraging entry into STEM (Science Technology Engineering and Mathematics) based subjects, which can develop specialist roles (e.g. engineers, planners), the supporting communication skills also need to be developed if they decide to pursue careers that require dedicated boundary spanning roles. Such mechanisms include outreach targeted at schools, for example, the 'make rain happy' campaign by Anglian Water focusing on SuDS retrofitting in schools (CB-15).

Universities have a role to play in building in skillsets into specialist disciplinary programmes (e.g. civil engineering) and also in establishing more programmes that help to

develop such inter-disciplinary profiles early. Additionally, opportunities should exist to develop and design MSc. and PhD research topics and internships in collaboration with FRM practitioners. Some examples of this were identified at the EA where there were students working with them on internships (CB-09). This is important for developing the interest and motivation amongst students to tackle such complex challenges like managing flood risk. Furthermore, individuals themselves while at university or college can take self-initiative to engage in different opportunities to build their network and increase their cross disciplinary knowledge e.g. organising seminars or forming a multi-disciplinary group or network.

Developing these boundary spanning skills, is even more challenging when there is a general skills shortage in the FRM sector, as identified in both England and Serbia, leading to a strong reliance on external skills usually from consultants. This breadth of skills required for the LLFAs is highlighted by the following quote;

An LLFA requires a real breadth of skills as it is a very varied role. It is hard to recruit experienced people into any public sector engineering or planning teams these days, but our role requires both of these skills plus good project management and great communication skills. (Cambridgeshire LLFA representative CB-17)

Some EA-led initiatives were identified that aim to partially fill this gap for specialist skills e.g. the EA foundation degree in River and Coastal Engineering. However, if those specialists are not trained in working in multi-disciplinary environments it limits their ability to develop into boundary spanning roles. The availability of such interdisciplinary training activities for students is beginning to emerge but is not yet common practice (see Cumiskey et al. (2019b) for an example of an international interdisciplinary training event on risk communication). Furthermore, the general skills shortage could lead to individuals taking on the (potential) boundary spanning roles who do not have all the required competencies, thus having a negative effect on integration in FRM. Additionally, the demand for such boundary spanning skills is likely to rise, as the value/evidence of working collaboratively emerges for FRM. Therefore, new inter-disciplinary training and education programmes are needed to increase the availability of boundary spanning individuals going forward, instead of training them in the same way – as demonstrated in the following quote;

A lot of it comes down to education, the engineers that were building the roads want to do it to the same means they were doing it 10 years ago and squeeze everything else around it. We are still training young people to do the same thing the same way. We know there is a better way to do it. (LLFA representative VE-01)

The findings presented supports Williams (2011) view that instead of creating a new profession connected to such boundary spanning roles (e.g. accredited programmes, education), the FRM sector need to embed boundary spanning skills and competencies within existing professional programmes (e.g. civil engineering, geography). In particular this idea links with the proposed specialist role whereby these boundary spanning skills can start to be ‘planted’ within the university training for technical specialists.

Furthermore, the importance to “*recruit for attitude, train for skills*” was identified during the skills session at the Flood and Coast conference (PO-25), emphasising that having positive personal attributes (as outlined in Section 7.2.2) is initially more critical than the skills which can be developed once hired. At the professional level, additional training and personal development opportunities (*actor-based mechanisms*) can help to instigate such interest from within professions e.g. secondments, mentoring, coaching, shadowing, job rotation, job assignment, and involvement in communities of practice (Williams, 2011). Furthermore, increasing the opportunities, especially for early career professionals to gain access to networking (Day 2000), for example by attending or observing at partnership meetings. More details on these profession-based mechanisms are described in the following section as they should continue after roles are generated.

7.4.2 Nurture and maintain roles

Once these boundary spanning roles are enabled, individuals’ boundary spanning skills need to be maintained, with opportunities to further develop their skills. Mechanisms that were found to have a positive impact on this so called ‘nurturing’ were training and career development opportunities (Vangen and Huxham 2003), along with having a means to recognise and acknowledge progress. Whereas, poor investment in staff and quick staff turnover was found to constrain the abilities of existing or emerging boundary spanning staff.

Training and skills development (actor-based mechanisms)

When an individual enters their professional career, multiple mechanisms were identified that can enable them to further grow their skills and abilities to act in a boundary spanning capacity, as outlined in Figure 7-5, and also recognised by other scholars (Day 2000, Williams 2011). The importance of gaining experience from different organisations and

their representative sectors proved very important to build skills to learn different professional ‘languages’, especially for the interpreter role.

Over my career I’ve worked for Defra, Natural England, a county council and district council. Everyone talks a slightly different language, so I think learning how to articulate flood risk messages in languages that your audience find appropriate is a real skill. Moving around different organisations and sectors and making sure that you’re on top of that. How do you communicate this to an external audience as well as, how can I develop my career within the sector that I want to? (Strategic growth advisor, panellist PO-25).

This quote demonstrates the importance of gradually moving from one sector or organisation to another to build different boundary spanning skills throughout an individual’s career, rather than picking the ‘perfect’ discipline, sector, or organisation to start with (PO-25). These skills can be developed through simply encouraging or allowing *job movements*. However, such movements are difficult to control and can act as a gain for one organisation at the loss of another organisation. Another more controlled way to enable such experience, is through *secondments* with other organisations and *movement within teams* internally within organisations e.g. within councils, EA or water companies where there are multiple sector interests represented, as additionally identified in the literature (Day 2000, Williams 2011). For example, the local levy role at Anglian water was previously completed by a seconded staff member from the EA to Anglian Water (PO-25). As one interviewee explained, these approaches can help “*build capacity to understand different people’s priorities – to respect those and understand those – but looking for ways to satisfy both perspectives*” (VE-04).

Specialised *capacity building and training workshops* were found to build skills on how to engage with other actors across disciplines. For example, the SCRIMP programme, developed by the Yorkshire RFCC engagement subgroup to increase the knowledge of the local authority members about flood risk and the importance of partnership working across sectors, especially for their engagement with the communities (LD-02; PO-4). This programme recognised that public sector employees and local politicians need capacity building just as much as community representatives to build their skills in partnership working (Taylor 2000). Tailored leadership development programs and training courses have been developed to enable such entrepreneurial or champion like behaviour e.g. Taylor et al. (2012). Such workshops or training can also be targeted at specialist roles, so they learn about the basics on collaborative working skills. This type of training can also be made available through Continuous Development Programmes (CDP) that counts towards achieving chartership (or other qualifications) e.g. CIWEM, Institute of Civil Engineers.

However, one interviewee identified that the cost of attending such training and events acts a barrier for attendance, especially for early career professionals (VE-06).

In addition, especially for the entrepreneur and reticulist roles, it is important that experiences are shared across regions to help exchange of lessons. Although capacity building was implemented for the FWMA (2010), it was not sustained, and now new knowledge needs to be exchanged (as explained in Section 5.2.1). This highlights the need for continuous exchange across existing partnerships in different regions and for different sectors, as illustrated by the following quote;

I think there is quite a lot of learning that needs to happen between all these types of roles within regions and across the country and I don't think there is enough sharing between local authorities and regional RFCCs. (CIRIA representative VE-06)

As mentioned in 2.3.1, Learning Action Alliances offer one approach to enabling such learning and exchange across areas for enabling urban resilience and blue-green infrastructure (van Herk et al. 2011, Ashley et al. 2012, O'Donnell et al. 2018). Additionally, mentoring was identified as an important means to build boundary spanning capacity in individuals. An example of this is the Women in FCERM initiative led by the EA (Women in FCERM 2019). Such initiatives have potential to encourage motivation and drive within individuals to step into boundary spanning roles in their career in FRM.

Furthermore, *networking activities*, in particular outside an individual's disciplinary comfort zone, were identified as being critical to further extend and maintain a network. Such networking activities identified in England included, Flood and Coast and CIWEM conferences, which can act as sources of inspiration and motivation offering opportunities to get more involved in organising activities, thus building an even stronger network. As highlighted by the Anglian Water flood partnerships manager during the panel session "*many come for the talks, but the networking is so beneficial*" (PO-25). However, similarly to the training, challenges include getting time off their regular work and funding for the attendance cost. Low-cost networking options identified included engaging informally through social media networks e.g. LinkedIn, Twitter (PO-25). Furthermore, more localised networks can be built by attending meetings which are less 'typical' to join and engaging in *bilateral discussions or conversations* to start to build a network at the early stages of an individual's career, as demonstrated in the following quote;

At the early stages of your career, the work you are likely to be doing will be more transactional work. Something will come in, a project, scheme you will be commenting on it. Rather than just keeping that electronic, use that to build the link – pick up the phone to whoever designed the scheme, or whoever put in the planning application. Use that to make those contacts. (Strategic growth advisor, panellist PO-25)

Additionally, joint *working arrangements* such as the Programme Delivery Units (PDUs) were found to be a useful *actor-based mechanism* that builds collaboration skills between consultants delivering FRM projects – in particular for specialists. Overall, these capacity building mechanisms are captured well within leadership literature, including, coaching, mentoring, networking, ‘stretch’ job assignments and project-based learning (Day 2000).

Recognition and acknowledgement

Another mechanism less evident in the literature, is the formal appreciation of individuals’ hard work. The recognition can feed individuals’ enthusiasm and empowerment, generating new ideas and a commitment to continuing their journey towards integration in FRM. This recognition was found to be in the form of more formalised *awards* or more simply by recognising the positive work achieved by those at a higher authority. For example, recognising catchment partnerships for the work they do on NFM, especially given the personal commitment from individuals;

I think a national acknowledgement of the catchment-based approach is important. As you saw here today as it happens because there are individuals that work hard to establish their relationships and bring it together. (Nene valley catchment partnership host CB-16)

In Serbia, the head of the DCP was recognised locally and nationally for his proactive contributions, in particular in relation to his efforts to change the law on local self-government. Although during the interview, when this was mentioned by his colleagues, he was found to be very humble and modest about receiving the recognition.

Today (12/09/2018) [Head of DCP] work was celebrated in the city council meeting and in Parliament the Minister of Public Administration specifically mentioned [Head of DCP] name. (Assistant mayor Kraljevo SB-06)

In England, numerous award opportunities were identified – these can be seen as an *actor-based mechanism*. In particular, the Flood and Coast awards recognise early career individuals including those aimed at a ‘rising star’ and ‘inspirational role model’. As the researcher was a member of the judging committee, it was very clear that partnership working were strong elements in both the nominees and winners – demonstrating personal qualities and skills similar to those discussed in Section 7.2. Furthermore, for the SuDS Champions Awards, the 2019 nominees similarly showed dedication and perseverance to

working on SuDS (Susdrain 2019a), whilst the winner demonstrated his commitment to training and community engagement and his eagerness to work with Susdrain during the implementation of Schedule 3 of the FWMA in Wales (Susdrain 2019b). Furthermore, this award helped the winner to gain recognition and credibility within their organisation (VE-06). Overall, this recognition, although not found to be strictly necessary to increase the impact of a particular boundary spanning role, it can contribute to sustaining their personal commitment and drive. Such recognition can therefore help individuals to avoid stakeholder fatigue, a symptom recognised by other scholars researching collaborative processes (de Vente et al. 2016), which can often result in personal costs to health and wellbeing for individuals.

Opportunities to grow and further develop (actor-based mechanisms)

As mentioned in Section 7.3.6, it is likely that boundary spanning roles change from one individual to another over time. Figure 7-6 aims to conceptualise these possible paths. Some roles will be better suited to individuals late in their professional career e.g. reticulist, given the time they need to develop a strong network and accrue political skills. This reticulist role can evolve through being a specialist, as found through many RFCC chairs who were specialists in non-FRM disciplines or sectors. Whereas other roles, such as the interpreter role, was identified to connect with more early or mid-career professionals. This was found in England where, more specialist-type roles emerged into interpreter roles due to the interest of individuals to engage across sectors and their skills to work collaboratively. The entrepreneur role was found to be more connected to those in mid to senior flood risk management positions who transitioned to that role later in their careers. Recognising the importance of collaboration for integration in FRM can be enough to motivate someone later in their career to transition from a specialist role, to a dedicated boundary spanning role. However, this can also happen early in an individual's career if they are exposed to a multi-disciplinary programme on FRM, potentially inspiring them to take on boundary spanning roles.

As outlined within this section, there needs to be a long-term commitment to building and refreshing skills no matter what stage an individual is at in their career. This can enable a natural progression into different boundary spanning roles and promote an environment where collaborative skills are valued. This is further discussed in the next section.

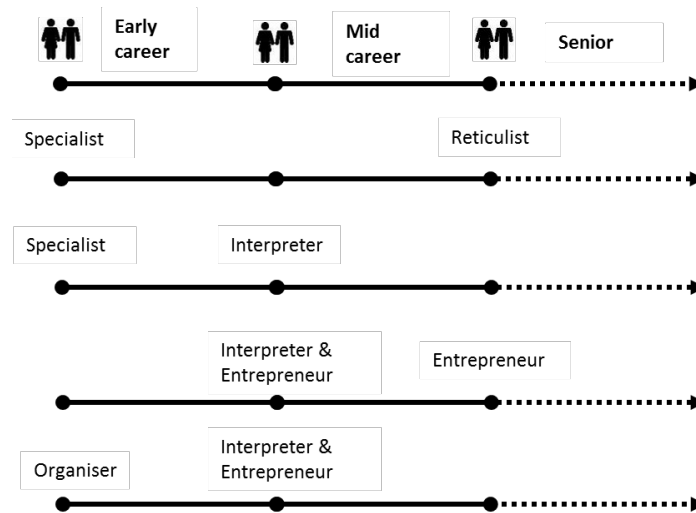


Figure 7-6 Possible career paths and interchange between boundary spanning roles

7.4.3 Long-term continuity

A number of important factors were identified to ensure that once boundary spanning roles are generated and maintained, they can continuously enable integration in FRM. These were mainly found to be influenced by the availability of *actor-* and *resource-based* mechanisms, and how these can build a culture of collaboration and sustain funding for staff and their capacity development.

Creating a collaborative culture (actor-based mechanisms)

Aside from developing skills, the importance of creating and sustaining a collaborative culture within and across organisations to support such individuals in the long run, emerged strongly from the interviews. This links back to the ‘aligned mind-set’ factor within the framework, influencing the strength of relationships across actors, as explained in Section 4.3.1. In England, the establishment of the PSO teams at the EA had that specific role to work as a team to support partnership working, clearly demonstrating the change in culture at the EA. However, this collaborative culture is not easy to achieve, especially if it is not embedded in the way individuals or their organisations work or if they are constrained by the previous mandates – as identified by the following quote.

But it’s also like they [some public bodies] have never done that [collaboration] before and ‘why should we start doing things now’. Internally [at the EA] we went through that transformation about engagement and going out to partners. I don’t think other public bodies have done that or are quite so on the ball. (EA Great Ouse representative CB-10)

The findings suggest that being surrounded by others in a supportive, positive and proactive environment that understands the value of joint working is important to feed individual's motivation and enthusiasm to continue to grow. Furthermore, being given the space to propose ideas and feel like they are being heard by others supports such a collaborative organisational culture. This could be seen in the Serbia case where the DCP team members fed off each other's energy. Similarly, between the CPCs and the DCP, they were motivated to work hard because they could see the value in the work they were doing, and it was strongly appreciated by the DCP. Furthermore, being open to listen to ideas from others no matter what 'rank' they are, was demonstrated by the head of the DCP who admitted that his team member "*is a fantastic guy, he is the one that makes a difference*" (SB-01). This suggests that having this chain of support from different levels – between different boundary spanning roles and across professional levels helps individuals to feed off each other's strengths. This highlights how such boundary spanning roles can improve the organisational environment around them elevating their interests, shared responsibility and vision of the group (Bass 1999, Hay 2006). Gradually promoting culture of collaboration and learning can encourage more boundary spanning individuals (Williams and Sullivan 2009, Barquet et al. 2016). A parallel can be drawn to the way the Sector for Emergency Management (SEM) responded to the changes in legislation demonstrating less willingness to engage in collaborative working, indicating that their organisational culture is difficult to change. The complexity of changing this organisational culture is captured well in the following quote;

I guess it is the view that if you have people that are willing to work together that they will do so irrespective of what the structures formally say but equally if you have people that don't want to work together, it doesn't matter what the structures you have they just won't do it. (Yorkshire RFCC chair LD-07)

This quote indicates that even if the mechanisms in place support collaborative working, some individuals will resist the change. Furthermore, it can be difficult for some proactive individuals within an organisation to persevere if the culture at higher organisational levels does not move in the same direction.

Continued resources for staff and their training

Next the issue lies in how to create and sustain such a positive boundary spanning collaborative culture. Here it was found to be strongly related to the availability and quality of staff, thus connected strongly to *resource-* and *actor-based mechanisms*. Both in England and Serbia public bodies were found to be under huge financial pressure, resulting in different effects on individuals. On the one hand, it caused actors who were not yet engaged

in collaborative working to sub-optimize and stop talking to one-another, cutting out any non-essential work because of a reduction in staff.

‘I’m just going to focus on my job and forget that actually it is important that I talk to this person, no I’ll do my job’ it’s what always happens. It’s a natural response to pressure you focus on what’s primarily paying your wages (Aire and Calder catchment partnership host LD-03)

On the other hand, it was found that austerity acts as an opportunity for those already engaged in collaboration (e.g. LRFs, RMAs), to capture the benefits of joint working and gain more efficiencies between partners. For example, as evidenced by the following quotes;

I think austerity is driving all the different organisations to share resources, it’s sort of like being driven down that route because of austerity. (West Yorkshire LRF representative LD-10).

As long as people are resource wealthy or comfortable, there is not an incentive to work with other people (Catchment partnership representative CB-16)

Many boundary spanning individuals were found to try and squeeze in additional meetings to develop new ideas collaboratively, without additional resources. An example of this was identified in Leeds for the Green Blue Infrastructure strategy consultation meetings (PO-20). These additional efforts to build collaboration and realise integration in practice for FRM are at risk if there is no long-term funding to sustain such activities.

Furthermore, funding cuts can have long-term repercussions on the availability of boundary spanning roles. In Serbia, the poor economic situation led to an employment ban in the public sector causing a generation gap in skills. In some cases, posts will be discontinued or have a time-limited nature e.g. PACM coordinator working on integrating flood risk and agriculture objectives (see section 5.1.3). Going back to the point about valuing the role of individuals, there is a risk that the work they did within their role will be quickly undone if discontinued (CB-13). This pattern of funding some dedicated but time limited posts was also found in the literature with strong presumptions that collaborative working is an extra duty to be added on to an already heavy workload, and training and development programmes on collaborative skills were rare (Williams and Sullivan 2009). Therefore, when investing in such individual roles, it is important to keep that long-term outlook on the value they provide to sustain them.

As discussed in the interviews, there is often the challenge of high staff turnover especially in public sector organisations. This makes it difficult to maintain strong boundary spanning roles that enable collaboration and integration for FRM. However, staff turnover was

identified as both a constraint and an enabler for building boundary spanning roles, as demonstrated by the following quote;

When it [staff turnover] happens at a critical point it can be very damaging if changed. But it also works the other way, if a person changes, then it influences 'fresh thinking' and things progress. You need to be pragmatic; change will happen, it may result in the need to change priorities. (LLFA representative Leeds VE-04)

This quote indicates that particular individuals can get stuck in their ways if they are in an organisation for too long and are less open to innovative collaborative approaches, thus staff turnover can help enable collaboration. For example, the staff turnover within ADA and the EA supported a culture of change and movement towards partnership working between the IDBs and EA (see Section 5.1.1). Additionally, this relates back to the collaborative culture point, whereby if individuals are motivated in their position, they will be less likely to move to another organisation or they move organisation with the intent to build their boundary spanning skills. Furthermore, as explained in Section 7.4.2 allowing staff to gain experience in different organisations can help them develop boundary spanning skills (e.g. secondments, project assignments). This could indicate a positive overall effect on integration for interpreter and entrepreneurial roles that move between organisations to gain more experience and skills. This again comes back to the need to provide staff with opportunities to grow their skills within organisations, so they are motivated to stay. However, the resources for this are typically cut first, as captured in the following quote;

In reality the first thing you cut is the training budget and it's the worst thing you can do. Essentially you stop 'watering the plant' ... When you are faced with a cut you often cut the wrong things. (RFCC representative VE-05)

Furthermore, given the wide array of partnerships in place in England, boundary spanning roles will continue to play an important part in sustaining actor relationships, deciding on how to allocate funding, developing knowledge and policies to support implementation of interventions. However, the interviewees discussed that in some cases other factors, such as pay and permanent contracts, are a more difficult barrier to influence, especially in the public sector (CB-17; LD-02).

These findings indicate that there needs to be some mechanisms in place to ensure the progress made by boundary spanning roles is not undermined if they are no longer available. By having a strong team of individuals who can grow into other roles, then the loss of individuals can act as an opportunity for others to step into those roles. Therefore, if there is confidence that individuals can be replaced with someone with similar boundary spanning

skills, staff turnover is less problematic. This goes back to the need to be able to identify roles and creating interest in embarking on such boundary spanning roles.

The above discussion in Section 7.4 is summarised in Table 7-3 reflecting on the mechanisms needed for each of the different roles to be generated, maintained and continued in the long-term, to enable integration in FRM.

Table 7-3 Specific mechanisms boundary spanning roles require for enabling integration in FRM

	Generation of role	Maintaining role	Long term continuity
Reticulist	<ul style="list-style-type: none"> FRM partnerships/ boards in place with ‘chair’ positions. 	<ul style="list-style-type: none"> Maintained funding for such partnerships. 	<ul style="list-style-type: none"> Continued opportunities for gaining experience within and outside the FRM sector.
Entrepreneur	<ul style="list-style-type: none"> Carefully selected recruitment criteria for flood risk managers (boundary spanning skills and personal attributes). 	<ul style="list-style-type: none"> Flexibility/ space for new testing innovation or ideas on integration in FRM. Opportunities to gain experiences from other sectors and policy/practice. Recognition e.g. awards. 	<ul style="list-style-type: none"> Training and mentoring for other roles to transition into entrepreneurial roles.
Interpreter	<ul style="list-style-type: none"> Funding sources e.g. local levy to hire full-time individuals. Rules that allow individuals to be hired with joint funds. Secondments/networking to generate skills and motivate interest. 	<ul style="list-style-type: none"> Knowledge development across sectors e.g. jobs secondments/ rotations so they build their ‘professional languages’ and gain ‘insider’ intelligence. Networking opportunities. 	<ul style="list-style-type: none"> Sustained funding for the role (embedded in an organisation). Ability to offer full-time contracts (not year-on-year commitment).
Organiser	<ul style="list-style-type: none"> Partnerships in place/ being developed that require this role. 	<ul style="list-style-type: none"> Funding for dedicated roles. 	<ul style="list-style-type: none"> Opportunities to move into other boundary spanning roles.
Specialist	<ul style="list-style-type: none"> Multi-disciplinary projects/assignments in university and professional training. 	<ul style="list-style-type: none"> CPD training on multi-disciplinary working. Joint working arrangements e.g. PDUs, colocated teams. Networking opportunities. 	<ul style="list-style-type: none"> Opportunities to move around sectors or gain management experience (to merge/grow into other boundary spanning roles),

7.5 Implications for integration in flood risk management

This section broadens out the above discussion on the interplay between individual roles and the underlying *actor-, rule-, and resource-based mechanisms* to further discuss the influence of ‘structure-agency’ interplay on integration in FRM. The findings strongly support the research of Williams (2011) which identified four boundary spanning roles, along with research specifically on flooding that advocates for the roles of individuals (albeit under different names) e.g. SUDS champions (Taylor 2009, Taylor et al. 2012). Furthermore, Williams and Sullivan (2009) argue that structural reform alone is unlikely to be enough to enable integration and agential stimulants need to be factored into the process. This view is supported in this research where an RFCC representative explained that “*any reviews of architecture could be counterproductive because you’ll never get it absolutely right*” (LD-07). Such reforms can cause upheaval and uncertainty, undermining the existing partnerships, networks and relationships (Williams and Sullivan 2009). In the English case this was found when new catchment partnerships were introduced without close consideration of the existing partnership (as discussed in Section 5.1.3). Therefore, indicating that the mechanisms in place will never be perfect and thus require boundary spanning roles to facilitate their effective implementation or advocate changes. This indicates that structural reforms and/or mix of mechanisms alone cannot enable integration in FRM, therefore such boundary spanning roles are required.

However, it was identified that there is a limit to how far individuals can progress integration until the supporting mechanisms are in place. This is clearly evident in the English case where the entrepreneurs were able to creatively utilise existing funding sources to generate integrated or multi-benefit projects, but without their creativity to disentangle the associated funding ‘strings’, this would not have happened. Therefore, such boundary spanning creativity is unlikely to be consistently available, thus cannot be replicated on a large scale without the underlying funding mechanisms being adjusted. Similarly, in Serbia the lack of resources hindered the growth of all the boundary spanning roles, limiting their ability to enable integration in FRM. Therefore, indicating that such leadership alone cannot compensate for a vacuum of *resource-based mechanisms*, as identified by Williams and Sullivan (2009). Overall, the evidence suggests that integration in FRM cannot be achieved by only adjusting mechanisms or only ensuring there are strong boundary spanning roles in place. Therefore, the findings capture well the argument put forward by Williams and

Sullivan (2009), that structure and agential factors have interconnected roles to play in enabling integration in FRM and both need attention.

Furthermore, the applications of the framework in Serbia and England demonstrated how ‘small wins’ can gradually support integration in FRM (Termeer et al. 2017). The findings presented in this chapter strongly support this, whereby the individual roles are able to gradually build up staff levels, form partnerships, disentangle the ‘strings’ associated with funding mechanisms or identify new funding streams to unlock opportunities for integration in FRM. Jointly the efforts to influence such mechanisms combine to influence the realisation of integration in FRM practice through knowledge, policies and interventions which capture the synergies across actors and their associated sectors. However, a variety of limiting factors within *actor*-, *rule*- and *resources*-based mechanisms hinder an individual’s capacity to develop into boundary spanning roles. The importance of having *resource-based mechanisms* in place to identify and sustain these individual roles was apparent throughout both case studies. Clearly funding is needed for staff across organisations working on FRM and cutting staff and their training comes with the risk of halting future ‘boundary spanning’ talent. Interestingly, in England it is becoming more common practice to fund jointly interpreter roles to strengthen bridging relationships but is still early days to assess the impact. Therefore, it is important to track and evaluate the contribution that these boundary spanning roles make to enable integration through improving the governance capacity for integration or realising it in practice for FRM.

Overall, in both case studies, despite having very different degrees of integration, the boundary spanning roles were found to have a significant influence on integration presently with this expected to continue on into the future. Furthermore, the more integration challenges addressed across sectors then the more boundary spanning roles are likely needed to achieve it, as in the case in England. Additionally, the more challenging boundaries in place (e.g. geographical, administrative) the more boundary spanning capacity is needed to manage them and build relationships across them. Therefore, resources need to be put into building these boundary spanning skills, or upskilling existing practitioners, and ensuring these are not the first mechanisms to be cut in difficult economic times. This can gradually support transformative change through developing a collaborative culture to enable more integration in FRM (Vangen and Huxham 2003, Termeer et al. 2017) – discussed further in Chapter 8.

7.6 Summary

This chapter provided evidence on the significance of a spectrum of boundary spanning roles for realising integration in FRM through their interaction with actor-, rule-, and resource-based mechanisms. In such a way, the theory on structure-agency interplay in the context of achieving FRM was advanced. Furthermore, the research added to the Williams (2011) roles i.e. reticulist, entrepreneur, interpreter, organiser, by including the specialist role (e.g. engineers, planners) to demonstrate the boundary spanning skills needed for specialists to engage with other actors on FRM. The chapter highlighted the critical mechanisms required to develop and sustain these boundary spanning roles so they can continuously support the realisation of integration in FRM. The importance of these boundary spanning roles in building a culture of collaboration within and between organisations to realise integration in FRM was demonstrated. This chapter answered research question 3.

Chapter 8 Reaching a desired degree of integration in flood risk management

The previous chapters presented and applied the framework for assessing integration in FRM, followed by an in-depth exploration of the role of boundary spanning individuals. This chapter utilises the insights gained from Chapters 4 to 7 to characterise four degrees of integration in FRM. In addition, it provides a guideline on how policymakers and practitioners can use the framework. Lastly, it highlights some recommendations on how to capture the opportunities that integration in FRM can provide. This chapter answers research question 4: *How can different degrees of integration be characterised and what guidance can actors follow on a journey to achieve their desired degree of integration in FRM?*

8.1 Understanding continuous and dynamic change

Each of the key elements of integration evolve and interact in very different ways for various integration challenges in different governance contexts. This interaction was conceptualised in Figure 2-5 in Chapter 2 and highlighted through the framework applications in Chapter 5 for England and Chapter 6 for Serbia. The Policy Arrangement Approach (Arts et al. 2006) as well as research from other scholars, emphasise the interactive nature of different elements of integration (Keast et al. 2007, Ansell and Gash 2007, Emerson et al. 2012, van Herk et al. 2015, Candel and Biesbroek 2016).

To help frame the different degrees of integration and their progression over time insights from organisational change theory are used. Termeer et al. (2017) builds on the work of others on organisational change and ‘small wins’ (Weick 1995, Weick and Quinn 1999, Vermaak 2013) to describe the depth, scope, and speed of change (as introduced in Figure 2-6 in Section 2.4). Characterising change in this way helps to capture the complexity of reaching a high degree of integration in FRM and the continuous nature of doing so. In relation to this study on integration in FRM, the depth, scope and speed of change are presented graphically in Figure 8-1 and explained further herein in line with the evidence

collected on FRM. In addition, within each of the degrees of integration presented in Section 8.2, the depth, scope and speed of change is reflected upon.

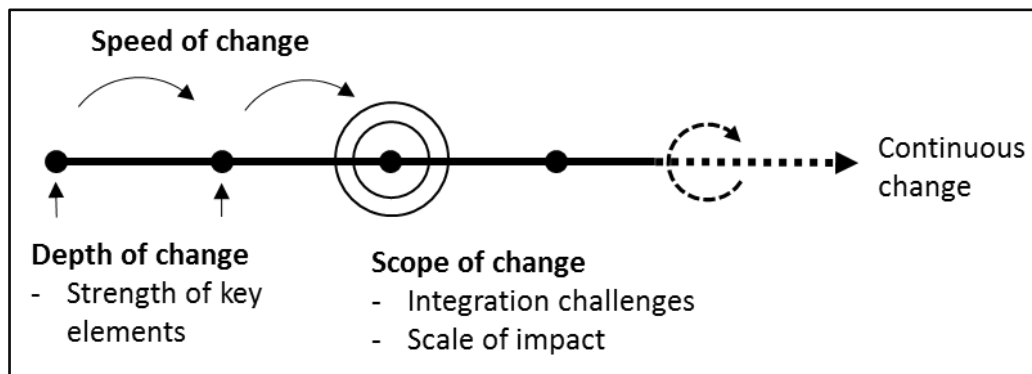


Figure 8-1 Dynamics of change influencing integration in flood risk management

The **depth of change** refers to the extent to which first, second or third order change happens. Building on the work of other scholars Vermaak (2013) summarises first order change as situations when things are done better within existing mind-sets, second order change as relating to breaking through mind-sets and reframing problems and practices from a different perspective, whereas third order change reflects continuous learning to learn. This concept of depth of change is further progressed in the context of the framework developed in this research on FRM. As such the depth of change can be connected to the improvements in the strength of each of the key elements, for either building the governance capacity or realising integration in practice for FRM (i.e. ‘small wins’). Deeper change would present situations where more elements are strengthened. In this way, first order change is likely to still have weak relationships between actors with only some improvements in realising integration in practice. In comparison, second order change has stronger relationships, influencing mechanisms and a higher capacity to realise integration in practice. Third order change reflects stronger relationships and influencing mechanisms that continuously realise integration in practice and learn. Subsequently, this research applies the depth of change directly to the strength of the key elements.

The **scope of change** generally refers to the scale of change, which can vary from widespread change at a system level (broad scope of change) to small piecewise change at a localised level (narrow scope of change) (Termeer et al. 2017). This is important in the context of integration in FRM because it can highlight the imbalance often seen across the scattered progress at the local level, compared with widespread change at a larger scale. For integration in FRM, for example, a broader scope of change could be achieved by changing

mainstream funding mechanisms to incentivise widespread joint outcomes for FRM e.g. Partnership Funding in England. Contrary to this, more localised change (narrow scope) could be achieved if boundary spanning individuals creatively use existing mechanisms to realise outcomes for FRM in a particular area. For example, in Serbia the lack of funding locally for Departments of Civil Protection to implement new regulations resulted in patchy improvements based on individuals ability to identify and use resources efficiently (see Section 6.3.4). Furthermore, in the context of this research, the scope of change also fits nicely with the breadth of the FRM integration challenges being addressed, for example internally within FRM and/or across multiple sectors (see Figure 2-8). Therefore, a broader scope of change would mean multiple integration challenges are being addressed for FRM.

Finally, the **speed of change**, is the timeframe that change can be achieved within. The size of the steps of change can vary from gradual small steps in the short-term (often referred to as incremental change) or quick big jumps in the long-term (often referred to as transformational change) (Termeer et al. 2017). In the context of the framework, speed can be thought of as the time taken to improve each of the element's strength (i.e. depth of change) or scope of change (i.e. scale and types of integration challenges addressed). As identified in both case studies, the speed of change is also influenced by the capacity of the actors to embrace change. Even if funding for FRM is quickly available, it can be difficult for actors to spend it if they have a lack of risk knowledge and plans in place, thus slowing down progress (see Section 5.1.1). Another example is the gradual process of change needed to involve more actors in the development of the West Morava River Basin Partnership in Serbia to support a culture shift towards collaboration (see Section 6.3.1). Furthermore, external factors like flood events or conflicts are expected to influence the speed of change (Johnson and Priest 2008). In addition, the pressure of post-flood event funding can lead to rapid spending on more straightforward FRM solutions (e.g. heightening embankments) rather than more integrated interventions (e.g. land use planning) (Hartmann 2016).

Combining the depth, scope and speed of change, some authors argue that transformational change is associated with change that is in-depth, large scale and/or quick whereas incremental change is shallow, narrow in scope and slow (as summarised by Termeer et al. (2017)). Vermaak (2013) argues that the depth and scope of change are in constant competition. In this way, quick in-depth change is more feasible at the small scale while at the large-scale quick changes will be superficial and in-depth change takes a long time. This research supports this theoretical position, arguing that transformational change for

integration in FRM can be achieved through the gradual accomplishment of ‘small wins’ in each of the key elements of integration. Additionally, such a perspective recognises the steps needed to reach the paradigm shift towards integrated and/or holistic forms of FRM (APFM 2017). This is further discussed in the context of the degrees of integration herein.

8.2 Characterising degrees of integration in flood risk management

This section presents the four degrees of integration in FRM - minimal, low, intermediate and high, as derived from the insights generated through the applications of the framework. These are characterised by the relative strength of each of the elements of integration and the depth, scope and speed of change expected is discussed, as summarised in Table 8-1. The purpose of characterising these is to support policymakers and practitioners to gauge their current degree of integration and identify the steps that need to be taken to progress to a desired degree of integration in FRM. Using the term ‘desired’ attempts to recognise that the highest degree of integration is not achievable in all governance contexts.

Table 8-1 Summary of the change dynamics for each degree of integration in FRM

	Depth	Scope	Speed
High integration	Strong key elements for realising integration and continuous learning enabled (high 2 nd /3 rd order change).	Generally widespread change, most integration challenges being addressed but narrower scope for some sectoral integration challenges.	Strong capacity to respond quickly to changes and enable continuous improvements.
Intermediate integration	Strengthened relationships and influencing mechanisms with some realisation of integration (2 nd some 3 rd order change).	Narrow scope of change for sector-specific integration challenges but wider for internal FRM challenges.	Quick changes dependant on individual’s ability to utilise mechanisms and slow progression to change mechanisms.
Low integration	Some strengthened relationships and some realisation of integration through knowledge (1 st , some 2 nd order change).	Narrow scope of change area or project-specific and attempts to achieve wide scope of change are unsuccessful. Main focus on internal integration FRM.	Fast changes fail Slow gradual changes progress but still strongly dependant on individuals to increase governance capacity for integration.
Minimal integration	Few strengthened relationships, weak realisation of integration (1 st order change).	Narrow scope (project or location specific). Focus on internal integration in FRM.	Slow changes and dependant on individuals. Fast changes fail.

8.2.1 Minimal integration

Starting at the minimal degree of integration, this is likely to represent the beginning of a journey towards achieving integration in FRM for a particular challenge. This degree of integration was mainly distinguished based on insights from the Serbian case study because of its lower degree of integration in FRM compared to England. However, additional insights were gained from the English case study whereby the actors discussed how they did not want to ‘go backwards’ to situations in the past where the key FRM actors did not have a shared understanding of FRM and conflicts prevailed.

Minimal integration is expected to have weak bridging and linking relationships where actors have competing perspectives and insufficient or poor-quality actor-, rule- and resource-based mechanisms to enable interaction. However, bonding relationships are expected to be slightly better as some actors have higher levels of interaction improved through some strengthened actor-based mechanisms (e.g. boundary spanning staff). Furthermore, improvements to rule-based mechanisms (e.g. clarifying roles and responsibilities) help to motivate boundary spanning individuals to enable integration despite limited resource-based mechanisms. Therefore, some ‘small wins’ can be captured through these stronger bonding relationships to help ‘get the ball rolling’ to generate some output for realising integration in FRM practice. For example, this is demonstrated in the Serbian case through the Department of Civil Protection who managed to increase the availability of risk knowledge in the municipality, thus implementing some of their new responsibilities in FRM. Poor availability and alignment of FRM and sector-specific plans are expected at this degree of integration. Limited attempts are made by actors to capture synergies and efficiencies across FRM and sector-specific interventions because this is perceived to be a time-consuming and costly process. This degree of integration is presented graphically in Figure 8-2 and summarised in Table 8-2.

Overall, achieving integration at this degree is highly dependent on individuals to use their personal networks to capture ‘small wins’ for integration. This is because the governance mechanisms in place are not facilitating integration and the mind-sets between actors are generally not aligned on FRM. This degree of integration demonstrates the need to begin a journey towards achieving more integration by building relationships and improving at a minimum the actor-based mechanisms to generate some knowledge that can be used to facilitate learning across actors. Furthermore, the leadership and boundary spanning skills

from these few actors can help build trust and willingness of other actors but is likely to take a long time before results can be seen (Huxham and Vangen 2000a) for integration in FRM. Therefore, the depth of change is expected to be very much limited to first order change at a narrow scale and is expected to be slow to progress to higher degrees of integration without more widespread changes to the influencing mechanisms to build the governance capacity for integration. At a minimal degree of integration, the scope is expected to be limited to internal integration within FRM and possibly emergency management rather than addressing the more complex cross-sectoral integration challenges (e.g. environment and housing growth). Table 8-1 provides a summary of this degree of integration in relation to depth, scope and speed of change.

8.2.2 Low integration

The low degree of integration represents a state of integration in FRM which has progressed from the minimal level and is striving towards an intermediate degree of integration. Insights into this degree of integration were captured from both the English and Serbian applications of the framework. In England the FRM actors discussed how they evolved into working more closely with partners to realise integration through the implementation of the various mechanisms, including those in the FWMA (2010). Whereas, in Serbia this degree of integration emerged after attempts to improve legislation failed to enable widespread change for integration in FRM.

At a low degree of integration, mind-sets between some actors are starting to align on FRM, in particular for bonding relationships (moderate strength) and to a lesser degree with bridging and linking relationships (moderate to weak strength). Overall, there are still a lot of weak relationships at this degree of integration because the culture and mind-set has not shifted and is difficult to accelerate. It is expected to be easier to align mind-sets with FRM actors than across sector-specific actors, especially if there is a long history of working in silos. Some positive and negatively influencing mechanisms are expected to be available but require adjustment to better support integration. Some presence of joint knowledge is expected but with limited use to influence other elements of integration. FRM policies are expected to have moderate alignment (objectives, interventions, timelines) compared to weak alignment with sector-specific policies because of the limited interest of sector-specific actors. FRM interventions are expected to focus on efficiency gains and managing critical trade-offs but only minor testing of multi-benefit interventions across sectors at a

pilot level. Therefore, this degree of integration is limiting FRM actors' ability to generate joint knowledge, policies and interventions for FRM at scale because of the restricted governance capacity for integration. This degree of integration is presented graphically in Figure 8-2 and summarised in Table 8-2.

Further reflecting on the scope and speed of change within this degree of integration, it is identified that a combination of actor-, rule- and resource-based mechanisms is needed to reach this degree of integration. Similarly, other authors recognise that although top-down government centric solutions that change the influencing mechanisms may be implemented, these are likely to take for granted the amount of time needed to strengthen relationships, and for actors to learn and jointly develop knowledge to alter their mind-sets (O'Brien 2012, Vermaak 2013, Olsson et al. 2014). This was seen through the law changes (LES and Water Law) in Serbia which despite being implemented fast and at scale (due to external policy pressures) lacked the supporting resources to enable effective implementation, thus resulting in limited changes to key elements of integration (see Section 6.3.1). Therefore, mechanisms targeting both in-depth change at the local level and widespread change (scope) was not feasible without the additional mechanisms, thus supporting Vermaak (2013) who argues that wide scope and in-depth change are very difficult to achieve together. Furthermore, fast changes to regulations are also likely to feel overwhelming for some actors who are not well resourced to implement them. This also highlights a problem with very ambitious global or European policies (e.g. Sendai Framework for DRR and the Floods Directive) which demand a big step change for some countries to progress towards. Therefore, demonstrating that if changes are implemented quickly these policies will likely fail to achieve results at a large scale. Whereas in England, the rule-based mechanisms implemented through the FWMA (2010) were supported with some actor- and resource-based mechanisms which strongly influenced their ability to realise integration in practice (see Section 5.2.1). However, it still took time for momentum to build between key FRM actors in England to start to achieve 'small wins' (e.g. joint business cases, producing joint knowledge) for integration in FRM.

With regards to the scope of change, it is expected that a mix of integration challenges cross this degree of integration and will progress at different speeds, although internal integration within FRM is likely to remain the focus. Furthermore, different integration challenges will likely have different barriers hindering their ability to progress to a higher degree of integration. For example in England, a knowledge gap is hindering the adjustment of rule-

and resource-based mechanisms to enable widespread application on NFM (see Section 5.1.3). Whereas for the housing sector, poor design and enforcement of regulations targeted at private sector actors to enforce risk-informed development limited the degree of integration achieved (see Section 5.2.1). Additionally, as identified in Serbia inter-municipal cooperation could not happen until the Local Self-Government Law was adjusted, thus facilitating integration between FRM and emergency management at the river basin level (see Section 6.2.1). This degree of integration presents a situation where progress is made on improving the governance capacity but is not yet sufficiently realised in practice for integration in FRM. Table 8-1 provides a summary of this degree of integration in relation to depth, scope and speed of change.

8.2.3 Intermediate integration

The intermediate degree of integration was established using the integration profiles generated for the English application of the framework only, as the Serbian application had yet to reach this degree. The English application demonstrated a state of integration in FRM with significant progress through the gradual achievement of multiple ‘small wins’ yet gaps remained in fully capturing the potential for integration in FRM at large.

An intermediate degree of integration is expected to have aligned mind-sets and intense communication for most bonding relationships (strong to moderate strength) but still room to improve the bridging and linking relationships (moderate strength). The more challenging bridging and linking relationships require further time and effort to align mind-sets and increase communication intensity between actors. The implementation of actor-, rule- and resource-based mechanisms is expected to improve actors’ ability to work towards integration. However, some mechanisms still negatively influence their ability to realise integration in practice, such as funding ‘strings’ and limited participation in partnerships (as discussed in Section 0). For this reason, boundary spanning individuals still play an important role to fill the void with existing mechanisms. Knowledge plays a key role at this degree of integration, whereby it is jointly developed by most key actors and used as an evidence base to influence policies and interventions. FRM policies are expected to have strong alignment (objectives, interventions and timelines) but opportunities remain to improve alignment with sector-specific policies. Some FRM and sector-specific interventions are expected to deliver multiple benefits, manage trade-offs and gain

efficiencies; however, this is not yet business as usual or applied at scale. This degree of integration is presented graphically in Figure 8-2 and summarised in Table 8-2.

Overall, this degree of integration represents a state of constant flux whereby mechanisms are being adjusted, relationships strengthened, and outputs generated to realise integration in practice for FRM. The depth of change is expected to be 2nd order across most elements of integration, but challenges persist to address cross-sectoral integration for FRM. Furthermore, reflecting on the speed of the application of mechanisms, insights from the English case study highlight the need for time to capture ‘small wins’ across multiple elements of integration. For example, when building actor relationships through the Cambridgeshire FRM partnership, it took time to gradually bring actors on board and include other sectors, e.g. planning authorities, emergency management actors and eventually Highways England (see Section 5.1.1). Therefore, the process of strengthening these relationships takes a lot of time but can be achieved quicker if facilitated by additional resource-based mechanisms, as demonstrated in the following quote;

You start thinking, if you build a really good relationship then that is really resource heavy to get the results and it does work but it takes a hell of a lot of time. Whereas if you have this [funding mechanism], you’ll get results quicker. (LLFA representative VE-01)

The fast implementation of resource-based mechanisms (e.g. in England the designated NFM) did definitely accelerate integration between FRM and environment sectors. However, this did not enable change at a large scale but did enable in-depth change at project/pilot level within local areas (see Section 5.2.4). Therefore, realising integration for FRM in practice can be accelerated by careful application of combined actor-, rule- and resource-based mechanisms, as advocated by other scholars (Gunningham and Sinclair 1999). However, this can only speed up integration to a certain degree because the governance capacity needs time to adjust to those mechanisms and learn new skills to apply them. For example, Partnership Funding was a welcomed joint resource-based mechanism to support cross-sectoral integration for FRM, however, LLFAs did not have staff skilled to prepare the business cases and maximise the use of this fund. Additional training and capacity building were needed alongside the new funding mechanism (see Section 5.2.3). Furthermore, the growth of the LLFA teams demonstrated the need to gradually build a multi-disciplinary team with a wider skillset to enable integration across sectors for FRM. In addition, this degree of integration can be reached faster if the knowledge and plans are in place as a result of effective actor-based mechanisms (e.g. partnerships) that facilitate the

multi-actor engagement process (see Section 5.2.5) – as advocated by many scholars (Challies et al. 2016, Benson et al. 2016, O'Donnell et al. 2018).

The scope of change achieved at this degree of integration is likely to be reached for multiple integration challenges depending on governance capacity. For example, the Public Sector Cooperation Agreements (rule-based mechanisms) facilitated more efficiencies across the maintenance of 1st and 2nd level rivers by the IDBs and EA (see Section 5.1.1). Furthermore, it could be interpreted that the integration challenges reaching this degree of integration are likely to fit with the knowledge, experience and pre-existing relationships of the individuals tasked to do so. For example, in the LLFAs in England, more progress was made within certain sectors when their teams had people with experience and knowledge from those sectors (e.g. previous roles as specialists). Overall, this degree of integration represents a situation where outcomes for FRM are being realised through knowledge, policies and interventions but can be improved by further strengthening the governance capacity for integration from an FRM and sector-specific perspective. Table 8-1 provides a summary of this degree of integration in relation to depth, scope and speed of change.

8.2.4 High integration

The high degree of integration was distinguished through the research as a situation where actors can systematically align objectives and policies across sectors to deliver multiple benefits without any mechanisms acting as significant barriers. This degree of integration strongly recognises the dynamic nature of FRM and how it needs to respond to changes (for example in policy discourses or funding) both within FRM and other sectors. Furthermore, the governance capacity for integration is dynamic enough to be able to deal with setbacks presented, for example political events or flooding events. In such a way, it represents a state of constant learning and feedback between (new) actors and continuous improvement to deal with changing integration challenges.

Overall, a high degree of integration is expected to have strong relationships between key FRM actors (bonding) and strong to moderate bridging and linking relationships. Although at this degree of integration, sector-specific and community representatives are expected to be successfully engaged with FRM (e.g. in partnerships), these relationships require continuous nurturing especially to continuously build relationships with changing sector-specific actors (e.g. through staff turnover) (Vangen and Huxham 2003) and communities

with wide-ranging cultural norms and perceptions of risk (Mehring et al. 2018). Overall, the actor-, rule-, and resource-based mechanisms in place are positively influencing the strength of the relationships and their ability to realise integration in practice for FRM. However, some mechanisms outside the control of the FRM sector require continuous effort to influence (e.g. sector-specific rules). In this way the FRM mechanisms are continuously being tested and improved to better align with sector-specific objectives. At this high level of integration there is a strong presence of joint knowledge that is used to influence other elements of integration and is continuously being generated to meet the changing needs and emerging science and technology. Most FRM and sector-specific policies are expected to have aligned objectives, interventions and new joint policies available where necessary. Multiple benefits, managed trade-offs, and maximised efficiencies are gained across most FRM and sector-specific interventions. However, some challenges persist in integrating sector-specific policies and interventions with FRM because of the difficulties to influence some sector-specific mechanisms. This degree of integration is presented graphically in Figure 8-2 and summarised in Table 8-2.

At a high degree of integration, the scope is expected to be widespread whereby most critical integration challenges are being addressed and integration is being realised for FRM. The key benefit for reaching this degree of integration in FRM is that more knowledge, policies and interventions are continuously captured across sectors in a systematic way. This view supports the work of other scholars on continuous change (Weick and Quinn 1999, Termeer et al. 2017). Furthermore, a high degree of integration in FRM can be realised at a large scale instead of piecewise improvements as seen in the intermediate level. Ideally, this degree of integration represents a state where FRM is embedded in the priorities of government departments and their actor-, rule- and resource-based mechanisms to realise integration for FRM in practice at scale. As evidenced in Section 5.1.4, cross-governmental collaboration is needed in England to prioritise FRM across sectors (e.g. Defra, MHCLG and the Department of Transport), whereby some interviewees felt that such a change required powerful rules from the highest level of government i.e. Prime Minister (VE-05). However, reaching this degree of integration is expected to take time, especially to influence sector-specific relationships, mechanisms and outputs for FRM.

Governance capacity at this degree of integration (with strong bonding relationships and FRM specific mechanisms) should be strong enough to deal with external shocks and stresses and adapt to volatile and uncertain environments including financial crises,

changing political priorities and natural hazards. For this reason, even at this high degree of integration boundary spanning roles are still important, albeit to a lesser extent than for the lower degrees of integration. Overall, high integration does not represent ‘full’ or ‘complete’ integration because the view taken within this research is that achieving integration in FRM is constantly evolving whereby the governance capacity is systematically adjusting to opportunities and set-backs to realise integration in practice for FRM. To illustrate this not all elements are dark green in Figure 8-2. Table 8-1 provides a summary of this degree of integration in relation to depth, scope and speed of change.

8.2.5 Summarising and visualising the degrees of integration for flood risk management

As referred to in the above sub-sections, Figure 8-2 visualises the four degrees of integration by adapting the earlier presented visualisation in Chapter 4 (Figure 4-1), as used in Chapters 5 and 6. This visualisation demonstrates that the relative strength of each elements of integration is likely to be different at various degrees of integration, as each element can progress in different ways. Although each of the degrees of integration were already presented in the previous section, the critical insights and patterns are briefly reflected on herein.

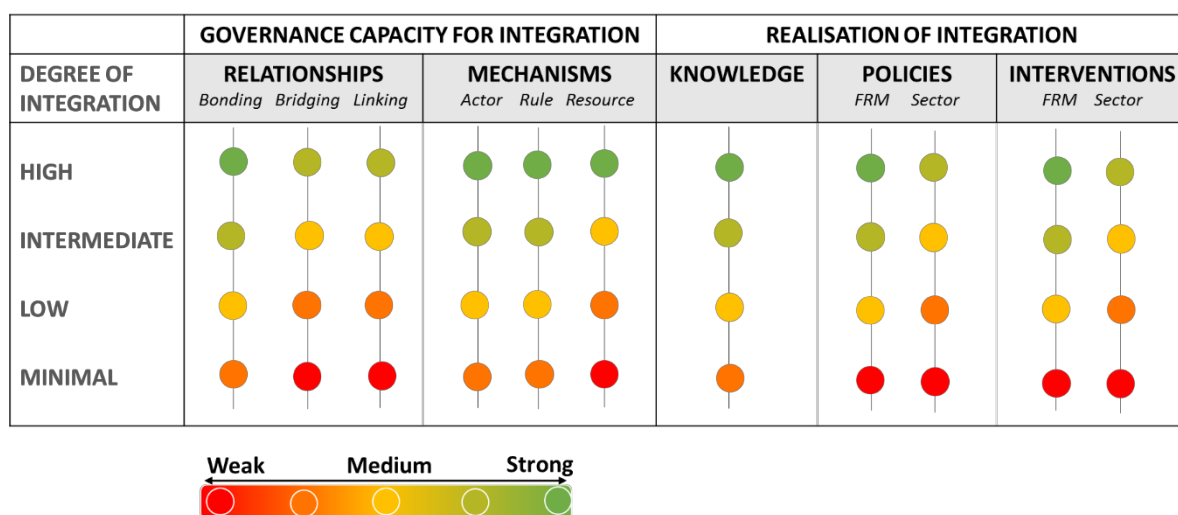


Figure 8-2 Characterising four degrees of integration – high, intermediate, low and minimal

Firstly, a pattern seen at the minimal degree of integration in Figure 8-2, is that to begin integration, actor relationships need to be strengthened with some basic actor-based mechanisms to generate knowledge and gradually work towards strengthening each of the

key elements to move to a higher degree of integration. Furthermore, some basic rule-based mechanisms are needed to clarify roles and responsibilities and empower boundary spanning individuals to progress towards a higher degree of integration in FRM. Although, ideally such a shift is supported through additional resource-based mechanisms.

Another pattern that can be identified across each of the degrees of integration in Figure 8-2, is that the bonding relationships are easier to improve than the bridging and linking relationships. Aligning mind-sets, generating a mutual understanding of FRM, willingness to work together, and increasing communication between actors is a lengthy process (Huxham and Vangen 2000a, Emerson et al. 2012). This is especially true for actors who have less interest or mandate on FRM. Many of these bridging relationships represent private sector actors with more dominant priorities other than FRM, thus making them more difficult to engage and sustain relationships with. At all degrees of integration these bridging and linking relationships are ‘more fragile’ and under less control by the FRM sector and so need to be really nurtured and monitored to continuously identify means to strengthen them (e.g. through interpreter roles) as compared to bonding relationships.

The pattern between these types of relationships is similar to the pattern seen between the FRM and sector-specific policies and interventions, as shown at the low, intermediate and high degrees of integration in Figure 8-2. This pattern aims to highlight how it is expected to be more difficult to embed FRM in sector-specific policies and interventions. Although this visualisation does not explicitly distinguish between FRM or sector driven actor-, rule-, and resource-based mechanisms, the findings suggest that a similar pattern is present to adjust and influence these sector-specific mechanisms (e.g. statutory consultee role, developer contribution funding). In this way, the FRM sector needs to be continuously identifying the best ways to capture some of the benefits for FRM across sector-specific knowledge, policies and interventions without waiting for changes to their sector-specific mechanisms. For example, investing in interpreter boundary spanning roles that can work closely with the planning authorities, water companies or community actors.

Another pattern that can be identified is that the resource-based mechanisms are likely to be falling behind the actor- and rule-based mechanisms – as seen at the minimal, low and intermediate degrees of integration in Figure 8-2. Although the funding is likely to be sufficient to develop knowledge, FRM policies and interventions, it hinders the progress of sector-specific interventions and bridging and linking relationships beyond pilot or small-

scale projects. Furthermore, as evidenced in the English case, the availability of resources is continuously fluctuating and can come in ebbs and flows depending on changing political priorities, thus is not necessarily in sync with actor- and rule-based mechanisms. In many cases, to compensate for a lack of mainstreamed resources to incentivise integration for FRM, boundary spanning individuals are relied on to creatively capture opportunities to realise integration in practice.

The identified degrees of integration and associated patterns of relative strength of each of the elements are not ‘set in stone’, thus can be further tested and refined through additional applications of the framework. Furthermore, the relative strength of the key elements at each degree aim to demonstrate the feasibility associated with reaching that strength in FRM, rather than presenting the relative significance or importance of each of the key elements for realising integration in practice for FRM. For example, Figure 8-2 does not indicate that sector-specific plans and interventions are less important for achieving integration in practice for FRM, instead it indicates that these are areas which require more attention.

Table 8-2 summarises each of the degrees of integration reflecting specifically on each key elements of integration and their associated indicators, as shown in Cumiskey et al. (2019c). This table can be used as a user-friendly way to identify the degree of integration for a specific integration challenge. Therefore, when using the framework, integration profiles can be mapped using Figure 8-2 to gain a clearer idea of the degree of integration or as highlighted in Chapter 4 using Figure 4-1.

The next section extends this discussion to present a guideline for policymakers and practitioners to utilise this framework. This was identified as an important aspect of the research, given its practical nature and direct ability to guide and influence FRM policy and practice. Furthermore, Section 8.4 highlights the key recommendations that policymakers and practitioners can utilise on their journey to achieving integration in FRM.

Table 8-2 Assessment table for identifying the degree of FRM integration (after Cumiskey et al. 2019b)

	GOVERNANCE CAPACITY FOR INTEGRATION		REALISATION OF INTEGRATION		
	Actor relationships	Influencing mechanisms	Knowledge	Policies	Interventions
<i>High integration</i>	Strong bonding relationships, bridging and linking relationships need continuous nurturing. Shared mind-set (proactive organisational culture, willingness to work together and understanding of inter-dependencies). High communication intensity (very frequent effective two-way interaction).	(+) Actor-based mechanisms in place and effective (diverse actors involved, benefits outweigh costs, resourced proactive staff). (+) Sufficient rules in place and enforced. (+) Variety of funding mechanisms accessible. Sector-specific mechanisms more difficult to influence.	Strong presence of knowledge (e.g. assessments, studies, datasets) - developed by and shared across a variety of actors, and used to influence other elements (policies, interventions, mechanisms and relationships). Knowledge adapts to changing needs/ science/technology.	Some new joint plans exist. Strong alignment between different FRM plans (sources flood risk, temporal scale, spatial boundaries). Strong to moderate alignment between FRM and sector-specific plans (objectives, joint interventions, timelines, boundaries).	Strong integration between FRM interventions and most sector-specific interventions. Systematically capture multiple benefits, manage trade-offs, and gain efficiencies. Some challenges persist to capture synergies across sectors at scale.
<i>Intermediate integration</i>	Strong-moderate bonding, and moderate bridging and linking relationships. Mostly shared mind-sets (general willingness to work together and manage inter-dependencies but some barriers exist). Increasing communication intensity (frequency and effectiveness improving).	(+) Actor-based mechanisms in place but all not fully effective (e.g. poor diversity of actors, insufficient staff). (+/-) Rules available but some are not well designed or enforced. (+/-) Some joint-funding available but some limitations and 'strings' attached when accessing wider (sector) funding.	Strong to moderate presence of knowledge (e.g. assessments, studies, datasets) - most developed by and shared across a variety of actors and used to influence other elements.	Some new joint plans exist. Strong-moderate alignment between different FRM plans (sources flood risk, temporal scale, spatial boundaries). Moderate alignment between FRM plans and some sector-specific plans (objectives, interventions, timelines, boundaries).	Moderate to strong integration between FRM interventions and moderate with sector-specific interventions. Some FRM interventions capture multiple benefits and manage trade-offs (on project basis). Cost/time efficiencies gained across FRM and sector-specific interventions.
<i>Low integration</i>	Moderate bonding, and moderate to weak bridging and linking relationships. Mind-sets starting to align (willingness is growing, understanding of importance to work jointly but focus on own interests). Mixed communication intensity (varied frequency and quality).	(-/+) Some actor-based mechanisms in place (e.g. focal points, meetings) with varied effectiveness. (+/-) Some rules present but often poorly designed or enforced. (+/-) Some funding mechanisms but no joint-funding and difficult to combine funding sources.	Moderate presence of knowledge (e.g. assessments, studies, datasets) - some developed jointly by a variety of actors but often not shared, and limited use to influence other elements.	No joint plans. Moderate alignment between different FRM plans (sources flood risk, temporal scale, spatial boundaries) but some FRM plans may not exist. Moderate to weak alignment between different FRM plans and sector-specific plans.	Moderate integration between FRM interventions and moderate to weak with sector-specific interventions. Piloting multi-benefit interventions. Most critical trade-offs managed. Efficiencies delivered for some interventions.
<i>Minimal integration</i>	Moderate to weak bonding, and weak bridging and linking relationships. Different mind-sets (siloed organisational culture, poor willingness to work together - 'someone else's problem'). Poor communication intensity (low frequency and only one-way).	(-/+) Some basic actor-based mechanisms in place (e.g. bilateral meetings, boundary spanning staff) but effective with only some actors. (-) Some rules present but poorly designed and enforced. (-) Poor availability of funding mechanisms.	Moderate to weak presence of knowledge - mostly not developed jointly, shared across actors, or effectively used to influence other elements but acts as a good starting point for collaboration.	No joint plans. Weak alignment of different FRM plans and/or lack of availability. Weak alignment between FRM and sector-specific plans.	Weak integration of FRM and sector-specific interventions. No multiple benefits captured. Conflicts/ negative side-effects not managed. In-efficient implementation.

8.3 Guidance for policymakers and practitioners for applying the framework

This section is targeted specifically at potential users of the assessment framework to guide them on how to utilise it through their roles in FRM policy or practice. To do so, a guideline is proposed herein. The guidance is developed more specifically for FRM integration challenges and can be used by either FRM or sector-specific policymakers or practitioners.

The guideline includes the following three key questions to help users implement the assessment framework in the most suitable way to meet their needs:

- 1) **What** is the user's purpose of the assessment?
- 2) **Who** is involved in the data collection and assessment?
- 3) **How** is the assessment conducted?

The options to consider for each of these steps are further explained in the following Box 8-1. The guidance also includes cross-references to important tables and figures used in other chapters, in particular Chapter 4, as it explains the core content of the framework. In addition, more detailed examples of these steps to apply the framework for policymaking and FRM in practice are outlined in the following subsections, and subsequent tables.

This guidance has been developed based on insights from policymakers and practitioners from the verification interviews and through the applications of the framework in Chapters 5 and 6. However, it is important to recognise that the framework has not been tested for all of the proposed applications to policy and practice. Therefore, it is recommended that further testing of the framework is completed to further refine this guideline to meet the specific needs of policymakers and practitioners. Furthermore, researchers can test the broader applicability of the framework to different integration challenges, however, this is not the focus of the guideline.

Box 8-1: Guideline for applying the framework for assessing integration

- 1. WHAT is the user's purpose?** Identify the integration challenge(s) that need to be assessed to meet the policy or practice-based purpose, such as to:
 - a. Gain an overarching assessment for specific integration challenges (see list of possible challenges for FRM in Figure 2-8);
 - b. Understand the influence of one element of integration (e.g. mechanism) on others;
 - c. Increase actors' awareness of the elements of integration to strengthen actor relationships or facilitate training.
- 2. WHO is involved?** Identify who will apply the framework and who is suitable and/or feasible to inform the data collection, such as:
 - a. A policymaker or practitioner for individual use or in bilateral or group meetings (e.g. self-assessment based on experience and validated/discussed with other actors);
 - b. Policymaker or practitioner-led data collection from a diverse a group of actors using:
 - i. Interviews (survey-based or qualitative in-depth);
 - ii. Participatory group exercises.
- 3. HOW is it conducted?** Conduct the most suitable type of assessment with the framework.
 - a. *In-depth assessment* for an integration challenge as outlined in Chapter 4 and demonstrated in Chapters 5 and 6. Data most likely collected using method 2b.
 - i. Generate a list and/or figure of all the appropriate and relevant elements that can be considered in the assessment:
 - *Governance capacity* – types of actor relationships (Figure 4-3), actor- (Table 4-3) rule- (Table 4-4) and resource-based (Table 4-5) mechanisms;
 - *Realisation of integration* - knowledge outputs (Table 4-7), FRM and sector-specific plans (Table 4-9), and interventions (Figure 4-4).
 - ii. Assess the strength of each key element using tables in Chapter 4 with the selected data collection approach:
 - *Governance capacity* - actor relationships (Table 4-1) and influencing mechanisms (Table 4-2);
 - *Realisation of integration* - knowledge (Table 4-6), FRM and sector-specific plans (Table 4-8) and interventions (Table 4-10).
 - iii. Draw the integration profile and identify the degree of integration - Figure 8-2.
 - b. *Focused application* analysing the influence of one specific element (e.g. mechanism, relationship, intervention, policy) on others. Follow a similar process to 3a above but start the assessment with the element in focus and identify the elements that are likely to have a particular influence on it. Data is more likely collected using method 2a.
 - c. *Quick application* to get a rough assessment of the most relatable degree of integration using Table 8-2 and Figure 8-2. This is more likely to be done on an individual basis with no additional data collection, using existing knowledge or examples (2a).

8.3.1 Applications for policymakers

The framework offers a useful means for policymakers (FRM or sector-specific) to facilitate more integration in FRM through the mechanisms, plans and/or guidance which they control. Based on the discussions with policymakers at the national level (in England) it became apparent that the framework could be used to help formulate new policy that supports more integrated approaches to FRM. In such a way, the framework can facilitate more structured dialogue on integration with FRM across different policy domains (e.g. environment, housing). Additionally, it can be useful for evaluating existing established policies or those which have been newly introduced, to better understand their influence on achieving integration for FRM. Examples are as follows:

- Develop an integration narrative for new aligned plans across sectors or evaluate/update existing plans e.g. Defra 25-year environment plan (HM Government 2018), English National FCERM Strategy (Environment Agency 2019b);
- Generate insights into the design and review of regulations and the supporting implementation mechanisms e.g. Flood and Water Management Act 2010 roles and responsibilities, biodiversity net gain;
- Design and review of resource-based mechanisms e.g. Partnership Funding, local levy;
- Support multi-actor dialogue on integration in FRM to strengthen relationships.

It is expected that more in-depth and focused framework applications can be conducted considering the role of national level policymakers in designing national mechanisms and plans that support FRM. As such, they are more familiar with collating evidence from other actors and analysing the impact of their different policies. In this way, the framework can help bring to the forefront the interconnectivity between the elements of integration policymakers influence and the other elements of integration. The framework can be applied by policymakers given their specific policy domain and relevant integration challenges e.g. cross-sectoral.

Following the questions outlined in the guideline above (Box 8-1), some specific examples are explained in Table 8-3 that can be considered when applying the framework as a policymaker.

Table 8-3 Examples of how policymakers can use the framework

WHAT?	WHO?	HOW?	POLICY EXAMPLE
Gain deeper understanding of a particular integration challenge, such as FRM and environment and agriculture.	Policymaker-led using interviews with multiple stakeholders	In-depth	Develop the FRM integration narrative in the Defra 25-year environment plan to assess the actor relationships, influencing mechanisms, knowledge, policies and interventions.
Identify the key gaps in existing elements of integration and identify areas for improvement for a specific integration challenge e.g. housing and growth.	Self-assessment generated by policymaker and updated in a group setting such as a stakeholder consultation.	Focused assessment	Identify the critical mechanisms hindering joint outcomes for FRM and housing that could be improved nationally e.g. developer contribution funds, statutory consultee role, regulations for using SuDS.
Understand the significance of one particular governance mechanism under the control of policymakers for particular FRM integration challenge.	Self-assessment by individual policymaker or multiple interviews with stakeholders (as appropriate).	Quick or focused	Understand the effect of the change in roles/responsibilities of specific actors on integration for FRM e.g. Law on Emergency Situations in Serbia or Flood and Water Management Act in England.
Multi-stakeholder dialogue on integration for a particular integration challenge.	Multi-stakeholder group setting (e.g. using results from an assessment)	Quick assessment	Using the framework application results to engage actors in discussion on integration (e.g. identify joint knowledge, plans, interventions) to strengthen their relationships.
Generate scenarios of how key elements can change under different future conditions (e.g. improvements to specific mechanisms) for specific integration challenges.	Policymaker-led using interviews with multiple stakeholders	In-depth or focused assessment	Understand the possible influence of improving regulations e.g. 'biodiversity net gain' can have on integration between FRM, environment and housing growth in the short and long-term.

Applications to policy for integration challenges wider than FRM, such as Disaster Risk Reduction, Climate Change Adaptation and (infrastructure) resilience is also anticipated. One interviewee highlighted this potential demonstrating that *“the concepts are very relevant to the resilience work we are doing at the moment ... We could experiment using this framework to other things that are not related to flood risk.”* (VE-02b). In such an application, the key elements of integration are likely still applicable but will require a clear focus on the integration challenge e.g. between two specific hazards (for DRR) or sectors (for CCA). The indicators may vary in importance or new indicators could be added. Therefore, the framework is likely to require further testing to enable broader applications.

8.3.2 Applications for practitioners

The framework developed has further potential to be applied by practitioners to inform more integrated FRM practices at an operational level. Given the complex array of actors at the local and regional levels, the framework helps to make the concept of integration more tangible for use in practice. In such a way, the following are examples of how the framework can support FRM practitioners' needs:

- Break down the complexity of integration between two sectors and highlight the opportunities and barriers for achieving it (as demonstrated in Chapter 5);
- Understand and clarify the influence of interventions, knowledge or plans on the governance capacity for integration;
- Facilitate the development and review of more aligned plans and/or capturing of more synergies and efficiencies across interventions;
- Through dialogue and discussion strengthen actor-relationships by sharing knowledge and aligning mind-sets;
- As a training tool to motivate and educate staff e.g. boundary spanning individuals.

The framework can be applied in different ways to meet these needs. In-depth assessment of all key elements can be completed for a particular integration challenge, as highlighted in Chapters 5 and 6. In addition, presenting the results of such an assessment would be useful to initiate discussion and interaction between actors during FRM related partnership meetings to reflect on achievements, barriers and areas for improvement to reach a higher degree of integration in FRM. More detailed specific applications (focused on one element) can help practitioners to think about how their knowledge, policies and interventions influence the governance capacity for integration. This could support them, for example, in developing their proposals or business cases for FRM projects. Furthermore, the assessment could focus on indicators of specific elements, e.g. the role of boundary spanning staff and identify the influence they have on specific mechanisms but also on achieving other elements of integration. Visualising each of the elements is expected to be useful for helping practitioners think about which elements need improving and how they are interconnected (VE-01).

However, it is expected that at a practitioner level there are fewer resources available to invest in detailed applications of the framework (e.g. conduct multiple interviews).

Therefore, individual assessment and its use in bilateral meetings or within existing partnerships is more likely. For example, the results of an assessment could be shared in meeting discussion papers and then used in a more interactive way during a meeting. In addition, a quick application of the framework (Table 8-2) would help practitioners to get a general positioning or awareness of integration, for example when engaging in a bilateral discussion across sectors. Furthermore, the examples for specific integration challenges (such as those presented in Chapter 5 and 6) are expected to be useful as training exercises for staff. Doing so can build their awareness of all the elements of integration and encourage more boundary spanning roles to emerge to facilitate integration (VE-01; VE-04).

Following the questions outlined in the guideline in Box 8-1, some examples are explained in Table 8-4 that can be considered when applying the framework as a FRM practitioner.

Table 8-4 Examples of how practitioners can use the framework

WHAT?	WHO?	HOW?	EXAMPLE
Identify the opportunities for integration between two sectors.	Practitioner-led self-assessment followed by bilateral meetings between FRM and sector representatives.	In-depth	Identify the strength of the actor relationships, influencing mechanisms, knowledge, policies and interventions, between FRM and emergency management to highlight areas for improvement.
Generate more knowledge on the influence of interventions on other elements of integration.	Practitioner-led self-assessment and discussed in bilateral or group-based meetings (e.g. in project meetings with partners or staff).	Focused	Identifying the influence that an NFM scheme has on other elements of integration (e.g. actor relationships) and deciding on how to sustain these improvements (e.g. investing in partnerships) or tackle remaining challenges (e.g. funding joint staff)
Support more alignment between plans for specific FRM integration challenges.	Practitioner-led self-assessment supported by feedback in plan consultation meetings.	Focused	Using the framework to identify areas to improve alignment between updates to Local FRM strategies and Regional FRM plans.
Support dialogue on integration in FRM to help strengthen actor relationships.	Participatory group-based exercises with multiple actors (in-depth) or use examples or draft results.	Quick or in-depth	Presenting framework results at a partnership meeting (e.g. RFCC) to facilitate dialogue on a particular integration challenge and help to align mindsets and increase communication.
Train and motivate staff e.g. 'boundary spanning' individuals working on specific or multiple FRM integration challenges.	Practitioner-led self-assessment with feedback from other actors (e.g. interviews) or using existing examples.	Quick or in-depth	Task new members of LLFAs in England or DCP staff in Serbia to apply the framework given their own knowledge and to engage in discussions with other actors, to facilitate their training on FRM.

8.4 Applied lessons for policymakers and practitioners on a journey to integration in flood risk management

Within this section recommendations are made for FRM and sector-specific practitioners and policymakers that draw on specific aspects of the framework. It is expected that this can help them to embrace and manage the complexity that the dynamic nature of a journey to integration in FRM presents. The overarching recommendation is the need to create and sustain a culture of continuous collaboration and learning within and across organisations to reach a desired degree of integration for a given integration challenge in FRM, as captured in Figure 8-3. Herein, collaboration represents the process of building strong relationships between FRM and sector-specific actors to build their governance capacity for integration, and to realise integration in practice for FRM. The recommendations are targeted more specifically to practitioners working on FRM at the local and regional levels (e.g. water companies, flood risk managers, EA area offices). However, these are also expected to be particularly useful for policymakers who design policies and associated resource-based mechanisms and thus influence the way in which practitioners operate on FRM locally (e.g. Defra). These recommendations are further explained herein, reflecting specifically on the associated ‘do’s and don’ts’ for policymakers and practitioners.

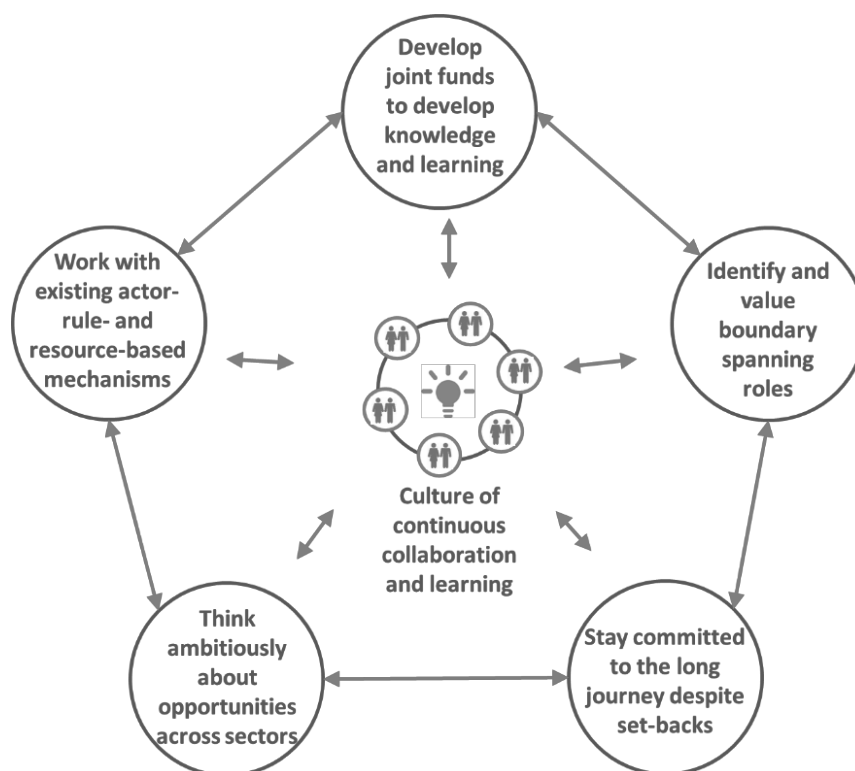


Figure 8-3 Overview of the key recommendations for policymakers and practitioners



Create a culture of collaboration and learning across responsible authorities, other sectors and communities to exchange knowledge, align perspectives and ambitions on managing flood risk in an integrated way.

The overarching recommendation from this research is to develop a culture of collaboration and learning within and across FRM and sector-specific organisations. Doing so will facilitate the gradual realisation of integration through joint knowledge and aligned policies that enable interventions that capture synergies and efficiencies for managing flood risk alongside wider sector objectives - so called ‘small wins’ (Vermaak 2013, Termeer and Dewulf 2019). Creating such a cultural change supports the governance shift towards more collaborative forms of governance (Ansell and Gash 2007, Emerson et al. 2012) and promotes continuous learning and exchange among actors (Newig et al. 2010, Benson et al. 2016). It is recommended that where possible existing actor-, rule-, and resource-based mechanisms are used, and emphasis is put on jointly funding this continuous collaboration and learning process. This is especially important to identify and fund boundary spanning roles (reticulist, entrepreneur, interpreter, organiser and specialist). These roles can strengthen and maintain actor relationships, creatively utilise existing mechanisms to deliver integration in practice and to future proof integration efforts by continuously developing and transferring skills. These recommendations place emphasis on the continuity of efforts needed to reach and maintain a desired degree of integration in FRM and continuously gain synergies across actors for integration in FRM, or so called collaborative advantage (Huxham 2003).

Both case studies demonstrated such a movement towards a culture of collaboration and learning, however, at different depths, scope and speeds, as explained in the previous section. Such an open and collaborative working culture can be promoted through high levels of organisations (e.g. boards, directors), as seen with the development of the PSO teams in the EA, and through the entrepreneur roles of the LLFA managers in England and the DCP manager in Serbia. It is expected to take a long time to change mind-sets and embrace a paradigm shift towards this type of working through well designed partnerships at different spatial levels and interpreter boundary spanning roles to engage actors across sectors. However, it can gradually develop even in very complex hierarchical organisational structures, such as that shown by the DCP office in Serbia. A generational shift through staff turnover is also likely to support such a change in hierarchical organisational structures but is again likely to take time.

Think ambitiously about possible joint opportunities between the management of flood risk across other sectors.



Jointly develop a ‘wish list’ ready to use when opportunities for change arise.

The next set of recommendations relate to the need to think ambitiously about the possibilities for integration across sectors, sources of flood risk, spatial scales and to develop a ‘wish list’ of possibilities to jointly address across actors. To achieve integration in FRM, actors need to go beyond managing trade-offs to capture synergies and efficiencies for all actors involved (i.e. collaborative advantage (Huxham 2003)). The process of identifying the opportunities helps to build that culture of collaboration and reviewing these opportunities facilitates learning (O’Donnell et al. 2018). As evidenced through the framework application, there are many opportunities to capture synergies across multiple sectors for FRM (e.g. time/cost savings, cross-sectoral benefits) but these are not always easy to identify because of misaligned mind-sets (Ansell and Gash 2007, Emerson et al. 2012). For example, despite discourses around SuDS and NFM gaining significance within the environment and agricultural sectors, opportunities within other sectors like housing and growth and emergency management still remain under achieved. As mentioned in Section 5.2.4, it is important to capture opportunities for synergies which may not be priority for the FRM sector (e.g. the areas at highest risk) but offer opportunities to test, innovate and demonstrate the potential to gain multiple outcomes across FRM and sector-specific objectives. This requires individual actors to engage beyond their knowledge, skills, experiences, and be willing and open to identify opportunities within other sectors and understand sector-specific constraints (e.g. within mechanisms), concerns and priorities (Brown et al. 2015). Although the overarching goal or ambition for FRM may not be initially agreed or clear for all actors, gradually gaining the skills to see FRM from other actors’ perspectives can help to build strong relationships and overcome (potential) conflicts (Vangen and Huxham 2003). This can then result in a list of priorities or opportunities for collaboration from both sides in some shape or form. Examples of this are as follows: a pipeline of projects that can be agreed formally via official plans (e.g. as seen in the surface water management plans or local FRM strategies in England) or more informally as a ‘wish list’ or opportunity mapping as seen for the infrastructure growth in England. This again emphasises the continual nature of enabling integration in FRM and being flexible to capture the arising opportunities from FRM and sector-specific perspectives.



Work within the existing mechanisms to make gradual progress on small wins



Avoid relying on ‘quick fix’ mechanisms - understand how mechanisms work in combination

This recommendation reflects on the importance of working within the existing actor-, rule- and resource-based mechanisms, where possible, to make initial progress to realise integration in practice through ‘small wins’ (Vermaak 2013, Termeer and Dewulf 2019). This can mean starting integration with the sectors that are ‘easier’ to integrate because they are physically close (e.g. both in the same department at the local authority), more knowledge exists to demonstrate the benefits, or the mechanisms are not hindering integration. For example, despite the link being good between local FRM partnerships and RFCCs, the links with sector-specific partnerships (e.g. planning, economic growth, emergency management, and environment) are still limited. Whereas, in Serbia no regional partnerships exist so these need to be established but the Emergency City Headquarters can be reformed/improved to facilitate more aspects of FRM. Boundary spanning roles can creatively utilise the existing mechanisms and test their flexibility to deliver the desired outcomes. Furthermore, within this recommendation, the need to avoid ‘quick fix’ mechanisms is emphasised which can hinder progress on integration in the long run instead of enabling it (Vermaak 2013). For example, lump sum funding for flood schemes, funding new partnerships after a flood event or quickly implementing a law without supporting resources. One interviewee from the National Infrastructure Commission agreed with this saying *“that is why sometimes people just put a new thing on top because it is more work to try to disentangle.”* (VE-02a). Forcing new structures at the local level risks undoing the great work that has already been completed and causing ‘distractions’ and insufficient time to learn the new arrangements (Olsson et al. 2014, O’Brien 2015). Instead existing actor-based mechanisms should have more flexibility to adapt over time to strengthen their connections with other sectors or spatial levels e.g. adding new members to partnerships or hiring new boundary spanning staff. Furthermore, the gaps in existing mechanisms can be jointly identified and advocated for their adjustment e.g. Partnership Funding criteria. However, rule-based mechanisms are more complex to influence, as seen with the SuDS Approval body (see Section 5.1.3) which failed to be implemented and the effect of the Local Self Government law in Serbia limiting cooperation across municipalities. Therefore, such changes are expected to take time and ‘quick fixes’ are unlikely to result in long-term change.

Develop and use joint funds for knowledge development, learning/ exchange and staff



Identify and value boundary spanning roles - embrace and nurture their skills

In addition, to the recommendations above, the importance of funding for enabling integration is drawn out further here. As shown through the framework applications, initial funding for developing joint knowledge was very useful for generating ‘small wins’ for integration e.g. joint studies for business cases or jointly funded staff (e.g. local levy funded). Having these funds also recognises the need to experiment and learn about different modes of behaviour to change mind-sets and increase communication strength between actors (Keast et al. 2007). However, the original design of such joint funds (e.g. local levy) was not as flexible and required creativity to push for spending on staff and studies. In such a way, there is an important role for ‘seed’ funding for building governance capacity for integration and generating the baseline of knowledge to further develop integrated outputs and thus “*shouldn’t be overlooked*” (VE-02a). In connection with this recommendation, as emphasised in Chapter 7, boundary spanning roles have a strong influence on the availability and effectiveness of resource-based mechanisms, as well as actor- and rule-based mechanisms, as similarly identified by Williams (2011). These individuals, in particular the entrepreneurs play an important role in being creative with funding ‘strings’ (e.g. timelines, criteria) to tap into wider sector funding sources such as those for economic and infrastructure growth. Furthermore, as described by one LLFA flood risk manager, the ability to be creative with existing funding is important because “*there is a lot more flexibility around existing mechanisms than meets the surface. You need to be willing to try and challenge the flexibility from both sides*” (VE-04). Additionally, the boundary spanning roles can utilise windows of opportunity in more effective ways (e.g. post-event funding in Leeds combined with growth funding). Nurturing the growth and development of these roles is fundamental for building and maintaining strong bonding, bridging and linking relationships and to enable learning and exchange across actors (Vangen and Huxham 2003). An example of this is how the “*local levy funded roles could not have foreseen 10 years ago the significance of working closely with other sectors ... It is something you learn along the way.*” (VE-01). This will, in turn, strongly influence the development of the culture of collaboration especially empowering those in the organisations interacting with them to build their boundary spanning skills. The cost of maintaining such roles (including training and skills development) and building a collaborative culture should not be underestimated or undervalued. Doing so can fit well with the use of joint funds.



**Avoid getting caught up
with barriers or fixed
boundaries**



**Stay committed for the long
journey of continuous
learning**

As highlighted throughout Section 8.2, achieving the desired degree of integration in FRM is expected to be a long, and sometimes bumpy journey (Vermaak 2013, Termeer and Dewulf 2019). Overall, the evidence collected from the case studies demonstrated that there are multiple fixed boundaries (e.g. catchment, administrative, economic) and barriers (e.g. political or private sector interests, staff turnover) which are likely to take a long time to change. Some locations will have easier boundaries to interface but possibly others which are more difficult. It is important to try to see beyond the physical boundaries, to embrace this complexity and use it to capture opportunities and learning across boundaries, working towards the culture of collaboration among actors (Ansell and Gash 2007, Emerson et al. 2012). In such a way, to achieve integration in FRM there needs to be constant learning and reflection on the current degree of integration and how it can be improved.

It is inevitable that there will be setbacks beyond the control of the FRM sector (e.g. housing targets), however there can also be unforeseen windows of opportunity emerging along the way (e.g. biodiversity net gain). Sometimes the pace will be faster (e.g. new funding allocations) and other times slower (e.g. time needed to change a law). Achieving integration is complex as it requires overlap between different governance systems. Therefore, it is important not to get demotivated with setbacks or failed attempts to tackle specific integration challenges. It is important to address the most feasible integration challenges but stay aware of the challenging ones that remain (e.g. integration between FRM and the housing and growth sector in England). Furthermore, one element might undergo a setback, but this may provide space or opportunities for another to strengthen. As shown in the English case, in some ways the setbacks (e.g. austerity) offered opportunities to work together more closely, thus strengthening actor relationships to enable integration in FRM. Building and maintaining positive momentum across actors is important for maintaining a degree of integration and to deal with setbacks or opportunities that arise. Although the benefits might not outweigh the costs at all points along the journey, overall it should balance. In such a way, a culture of collaboration and learning among actors is continuously being developed and shared (Newig et al. 2010, Benson et al. 2016) which can adapt and progress during difficult times.

8.5 Summary

This chapter presented the characterisation of four degrees of integration in FRM – high, intermediate, low and minimal and discussed the depth, scope and speed of change expected for each degree of integration. This chapter argued that transformational change for integration in FRM can be achieved through ‘small wins’ to improve each of the different elements of integration, gradually improving the governance capacity for integration and its realisation in practice for FRM to reach higher degrees of integration, supporting other scholars work on organisational change (Vermaak 2013, Termeer et al. 2017). A guideline was proposed to support the application of the framework for FRM policy and practice. Furthermore, the chapter emphasises the need to build a culture of collaboration and continuous learning and provided practical recommendations for policymakers and practitioners along their unique journey to integration in FRM. This chapter answered research question 4.

Chapter 9 Conclusions and future research

This chapter highlights the key contributions of this research to theory, policy and practice. The key limitations of the research are recognised and new areas for research are proposed to further advance the understanding, assessment and use of integration in the context of FRM. Additionally, this chapter provides an overview of how the research questions were fulfilled within this thesis.

9.1 Contributions to knowledge

This thesis contributes significantly to the body of knowledge by answering the research aim and questions. From a theoretical perspective it develops a more fine-tuned understanding of the concept of integration in the context of FRM. Furthermore, this research contributed to both theory and knowledge on FRM by developing a framework to assess integration. In addition, it provides guidance for policymakers and practitioners on a journey towards achieving integration in FRM. This research has addressed the following research questions (as specified in Section 1.4) centring on advancing the concept of integration in FRM theory, policy and practice.

1. What are the **different elements of integration** and how can they be assessed to understand the complexity of integration in FRM?
2. How can the assessment of these elements be used to identify **integration profiles** for different FRM integration challenges in different contexts?
3. How do the **mechanisms** in place enable or hinder **individuals'** ability to achieve integration in FRM and vice versa?
4. How can different **degrees of integration** in FRM be characterised and what guidance can actors follow on a journey to achieve their desired degree of integration in FRM?

The specific contributions to theory, policy and practice are discussed respectively herein.

9.1.1 Contribution to theory of integration in flood risk management

This thesis advanced the theoretical concept of integration in FRM by drawing on theories and approaches across policy analysis (Arts et al. 2006), collaborative governance (Ansell and Gash 2007), organisational change (Vermaak 2013, Termeer et al. 2017) and learning (Newig et al. 2010). These scholars address a variety of ‘wicked problems’ which benefit from integration because they are complex, uncertain and involve multiple actors (Head 2008). The research supported these scholars work but drew new insights by further applying it to the context of FRM.

The framework developed to assess integration in FRM brings together different domains of literature to identify the different elements of integration and assess them. The research supports ‘new forms of governance’ such as collaborative governance (Ansell and Gash 2007), expands on the Policy Arrangements Approach (PAA) (Arts et al. 2006) in the context of integration in FRM, and embeds other literature to distinguish other key elements and their indicators. For example, social capital literature is used to distinguish between bonding, bridging and linking relationships (Szreter and Woolcock 2004) and builds on the PAA to categorise actor-, rule- and resource-based mechanisms (Arts et al. 2006) to form the governance capacity for integration. The framework produced in this thesis emphasises the importance of continuously strengthening actor relationships and influencing actor-, rule-, and resource-based mechanisms to build governance capacity for integration, and realise it through knowledge, policies and interventions in FRM practice. The framework thus provides a contribution to theory by offering the research community a new approach to assess integration and further develop the findings presented within this thesis. The development of this framework answers *research question 1*.

The research progresses the conceptualisation of integration in FRM (but also applicable to wider contexts) as a dynamic and continuous process, demonstrating the interconnected flowing nature between the key elements (see Figure 2-5) as supported by other scholars (Arts et al. 2006, Vermaak 2013, Candel and Biesbroek 2016). The framework was applied in Chapters 5 and 6 to generate integration profiles and answers *research question 2*. The applications of the framework demonstrated that achieving the paradigm shift towards integration in FRM requires a long-term outlook on the strength of the actor relationships and the actor-, rule- and resource-based mechanisms that influence them, instead of a single focus on achieving results in practice, for example, multi-benefit interventions. Therefore,

many barriers for realising integration in FRM at scale are embedded in the existing governance system both nationally and locally.

The variations between the depth, speed and scope of change at different degrees of integration was demonstrated in Chapter 8, building on the work of other scholars on organisational change theory (Vermaak 2013, Termeer et al. 2017). The findings again highlight the dynamic evolving nature of progressing towards high degrees of integration in FRM for different integration challenges. In the context of FRM, the research evidenced how a gradual achievement of ‘small wins’ across the elements of integration is necessary, where learning and exchange between actors is critical to enable transformational change to reach the desired degree of integration in FRM. Therefore, contributing to answering *research question 4*.

Through the application of the framework, interesting findings emerged on the value that boundary spanning roles have on realising integration in FRM. Such roles were able to influence different actor-, rule- and resource-based mechanisms to generate more knowledge, policies and interventions for FRM. The research highlighted how the interplay between structure and agency can, in certain contexts, provide individual actors scope to support the mechanisms in place to advance integration in FRM. However, the research also strongly identified the need for continuous funding, training and flexible rules to generate, nurture and sustain these boundary spanning roles to continuously support integration in FRM. Therefore, this thesis has contributed to the structure-agency debate, demonstrating that structure and agency are inherently interconnected, as argued by other scholars (Giddens 1984, Hay 1995, Williams and Sullivan 2009). The research also extended the four boundary spanning roles presented by Williams (2011) - reticulist, entrepreneur, interpreter and organiser, to include the specialist. This is particularly important in the context of FRM because of the need for interdisciplinary innovation across sectors (e.g. SuDS, NFM) which requires specialists (e.g. engineers, planners) to be willing and open to collaborate with other disciplines to enable integration in FRM, thus specialists need to generate the skills to do so. As such the findings presented in Chapter 7 answered *research question 3*.

Finally, reflecting on the current contributions to theory on integration, it is evident that more research is evolving on actor relationships, connected to knowledge and actor-based mechanisms (and planning) – also specifically in the context of FRM. For example, Benson

et al. (2016) on social learning through RFCCs and O'Donnell et al. (2018) on Learning Action Alliances for green infrastructure. However, this thesis brings much more strongly to the forefront the need to critically consider the links with rule-based (e.g. cooperation agreements) and resource-based mechanisms (e.g. joint funds) and better understand how they connect with FRM and sector-specific plans and interventions to realise integration for FRM. These key elements are less evident in the governance and FRM literature, possibly due to the need to better consider private sector influences, however, they are starting to emerge more from research domains such as climate resilient infrastructure (Vallejo and Mullan 2017). This research contributes to bridging this gap.

9.1.2 Contributions to flood risk management policy and practice

The findings presented in this thesis, provide a new perspective on integration for FRM in practice. It cannot be denied that achieving integration in FRM is a complex and difficult task, but this thesis presents a framework which breaks integration down into its key elements and visually 'joins the dots' using integration profiles. It distinguishes between the governance capacity for integration (actor relationships and influencing mechanisms) and realising integration in practice through knowledge, policies and interventions. This is a useful distinction because as identified through the case study findings, the process of enabling integration is not linear, and efforts to enable integration can happen directly through projects and/or through improving the governance capacity. Therefore, by visualising all the elements together it can make it easier for practitioners or policymakers to identify the current achievements to enable integration (e.g. projects, knowledge) and distinguish the critical areas to further improve. Furthermore, the framework is flexible enough that it can be used for different purposes, as outlined in the application guideline presented in Section 8.3. For example, to get an in-depth understanding of the strength of each of the elements of integration using the indicators proposed (as shown in Chapter 4) or as a tool to help actors think more broadly about their integration challenges and the most feasible way to progress to realising the benefits of integration and overcoming the barriers (as presented in Chapter 8). Overall, the presentation of this framework answers *research question 1* and its application in two different contexts answers *research question 2*.

The findings from the application of the framework produced further insights into the barriers and enablers to achieve integration in FRM and a scale of the different degrees of integration. These insights were then captured in Chapter 8 as recommendations for

practitioners and policymakers on a journey to integration in FRM. The importance of building a culture of collaboration and continuous learning both within and across organisations was identified as a core requirement to enable continuous change towards integration in FRM. Nevertheless, the findings recognise how this is something challenging to accomplish and requires gradual efforts towards achieving ‘small wins’ across each of the elements of integration, especially to generate joint funding and knowledge which can form a baseline for further collaborative efforts. This is especially true in governance contexts which are more hierarchical and resource constrained, such as that presented in Serbia. However, this still holds true for countries such as England, which is more advanced on collaborative forms of working and investment in FRM, but gaps were still identified (e.g. unclear roles and responsibilities, funding criteria) that hindered a culture of collaboration especially across sectors and with communities. To generate, sustain and ensure continuity of such a culture of collaboration and learning, the need for boundary spanning roles alongside improved actor-, rule- and resource-based mechanisms was identified (answering *research question 3*). Chapter 8 presented a guideline for policymakers and practitioners to apply the framework along with recommendations on how to enable integration in FRM, leading to answering *research question 4*.

This thesis demonstrates that FRM needs to be more frequently seen through the eyes of sector-specific actors and how they can adjust their mechanisms, policies and relationships to capture the synergies and efficiencies that integration with FRM presents. Therefore, in practice it is important to recognise that FRM will likely form its own sector in some shape or form, however, more opportunities for FRM can be realised when the FRM sector looks to other sectors to embed their priorities within (e.g. for the environment through catchment partnerships). To do so, FRM actors need to always be aware and look at how the FRM sector-specific mechanisms (e.g. rules, funding) can be adapted to better support and embed other sector priorities and also look at how they can work closely with other sectors to guide them to adjust their mechanisms - depending on the characteristics of the integration challenge at hand. For this reason, there is still a lot of innovation that can be captured through improving the governance capacity for integration to help adapt, or work within the intricacies of the sector-specific mechanisms. Therefore, the position taken in this research is not to ‘integrate everything’ (i.e. merge multiple sectors) but to understand how the separate systems work across sectors (e.g. water, agriculture, housing) to form sufficient

bridges and links across these to achieve better outcomes for FRM and sector-specific objectives.

Reflecting on the use of the term integration in FRM policy and practice, as introduced in Chapter 1, it can get mixed-up with, or embedded within, other similar terms, such as catchment-based, resilience, adaptation or collaboration. Based on the insights generated from this research, the position taken is that it does not matter if the term integration is used or not in policies or discourses, the important thing is that the key elements of integration, and the associated indicators are considered. For example, the English Draft FCERM strategy is not explicitly framed around integration, yet covers many of the important elements but with a focus on climate resilience (Environment Agency 2019b). In such a way, this research takes the view that instead of promoting the concept of ‘integrated FRM’, the characteristics of integration should be embedded within the existing more prominent discourses in a given policy arena for FRM. This approach also helps to put more emphasis on the need for the FRM sector to learn how to see FRM through the eyes of other sectors to help them achieve their objectives, alongside those for FRM.

9.2 Research limitations

Within any research study there will be limitations. Firstly, the scope of integration in the context of FRM was limited to looking at specific sectors e.g. agriculture, economic growth, environment and emergency management. However, others such as health are also expected to have an influence on FRM (e.g. mental health and flood recovery) but were outside the scope of this study. Furthermore, the cross-links between the different sectors e.g. environment and growth were only briefly touched upon in order to maintain a strong focus on FRM. Additionally, as mentioned in Section 3.4.3 the research did not focus on an in-depth study with actors at the national or community level, which could compliment the current study.

The context of this study was in Europe and it is expected that other differences and insights could be revealed through the application of the framework in other geographical regions (e.g. Africa, Asia) with differing governance contexts (e.g. transboundary rivers) but similar desires to achieve integration in FRM. Furthermore, given the varied nature of integration challenges across different countries and their FRM governance contexts, there is a risk that comparisons of the framework applications could be misinterpreted. Nevertheless,

comparisons across different countries can give useful insights into different mechanisms, knowledge and interventions used to enable integration in FRM.

Despite the positive features of the framework, some limitations were also identified during the application. One limitation of the framework is the subjectivity of using the assessment indicators to determine the strength of each of the elements. Despite the qualitative descriptions being provided for each strength level of each key element, they still run the risk of being interpreted differently by different actors. For example, some actors may argue that one resource-based mechanism is stronger or weaker due to their particular knowledge and experiences, without taking an overarching view of the other mechanisms in place, thus introducing some bias into the assessment. However, this is not seen as a huge problem, especially if the framework is used to identify critical areas to improve rather than directly compare across regions or countries. In addition, the framework is not designed to be mechanically applied for rigid decision-making purposes, such as the allocation of funding.

Building on this point, some challenges did arise when generalising the strength of multiple components within specific indicators. For example, deciding on one strength level for bridging relationships when some were very strong and others weak. However, more detailed applications can map out the strength of specific relationships, as done in Serbia in Figure 6.2. Additionally, despite the distinction between bonding, bridging and linking relationships helping to break down the complexity of all the relationships and making the framework more flexible for multiple integration challenges, on occasions it was found to be challenging to distinguish between them. For example, in Serbia it was difficult to identify if the CPCs were bonding and linking actors because they are a community representative but also have a mandate on FRM. Furthermore, the framework was applied using the data collected over a specific period of time, and thus whilst relevant for this period, may not capture the most recent developments on FRM policy or practice.

This research was approached from a governance perspective utilising a qualitative methodology to understand the relationships between actors more generally and the mechanisms that influence them. However, the research could have been approached by pinpointing specific FRM and sector-specific interventions and from there assessing the governance capacity. This may have produced more detailed results on more specific mechanisms that influence the interventions (e.g. procurement procedures) and examples where efforts to achieve integration in FRM led to disappointing results. However,

approaching the research in such a way was deemed unsuitable because there was an insufficient understanding of different FRM and sector-specific projects at the time the research began. In addition, the governance approach taken to develop and apply the framework resulted in a broader understanding of how integration can be embedded within the existing governance systems instead of a project-driven perspective.

9.3 Future research

This study has laid the path for more specific research studies on integration in the context of FRM and other wicked challenges affecting society. Firstly, the framework in its current form can be further tested for different FRM and wider integration challenges and/or in different flood risk governance contexts to identify any further refinements to the indicators to enable its broader applicability. Further engagement and testing could be completed with policymakers, practitioners and researchers to adapt the framework, so it meets their specific needs (e.g. level of detail, visualisation). As a result, the guideline presented in Section 8.3 could be revised. Additionally, further research could attempt to quantify the different elements of integration to develop an overarching score or index for integration so that different integration challenges can be easily compared. However, it is expected that this will be a difficult task given the lack of data on the indicators and considering the variety of contextual conditions.

Additionally, through the applications in different contexts more insight can develop on the different interconnections between the key elements to help to further refine the degrees of integration. Other aspects to explore would be to identify the most efficient and sustainable way to progress through the elements and to better understand the trade-offs between speed of integration and the quality of integration for FRM. Therefore, contribute to a better understanding of the dynamics of integration over time.

Furthermore, the framework can be applied at the national or community level in England to gain more in-depth insights, for example, the types of partnerships and boundary spanning roles in operation at those levels. This research would also gain a deeper understanding of the role of politics at the national and local level and how it influences integration in FRM e.g. approving laws or policies related to FRM. Additionally, the influence of other external factors on integration should be explored, such as flood events and socio-economic conditions.

Further research is recommended to explore the role of specific influencing mechanisms and how they interact with others. Research from a legal background may provide further insights into the indicators for the rule-based mechanisms influence on integration. For example, the voluntary or mandatory nature of plans and partnerships and the role that formal versus informal rules play in encouraging collaboration among actors to enable integration for FRM. Similarly, research could delve into the indicators on the actor- and resource-based mechanisms. For instance, researching the different joint or merged funding mechanisms used globally to support integration. Specific interactions could also be further researched, for example, the long-term impact of funding cuts to staff and their associated training.

Psychology and behavioural science-based research could investigate the role that personal traits and characteristics play in decision-making and relationship building for integration. For example, the factors helping to initiate positive behaviour towards collaboration and ultimately integration. Additionally, research could address the negative influences of individuals on integration, the differences in the effects of integration between those who play boundary spanning roles as part of a dedicated role or ‘added on’ to their existing roles. Moreover, in relation to the findings on structure-agency interplay, further research could try to quantify the value of boundary spanning roles for integration.

Overall, this research highlighted a variety of different research areas to further explore on integration in theory, policy and practice.

9.4 Final reflections

This PhD thesis was not only a research journey but also a personal development journey, allowing me to reflect on my previous roles as a civil engineering student, consultant and researcher in FRM. I could closely relate to the challenges and opportunities identified, feeling empowered and motivated to continue working in this complex but exciting field. Throughout this PhD process I felt embraced by the ‘flood family’ in England especially through engagement in meetings, such as those for the National FCERM Strategy. This is a true reflection of the culture of collaboration and learning that is growing with the FRM community and its progress should not be jeopardised by funding cuts or shifting priorities. However, there is still much work needed to extend its ‘wings’ in a more concentrated way to strengthen relationships with other sectors (bridging) and communities (linking) to

achieve a higher degree of integration in FRM. In doing so, new mechanisms are likely to play a stronger role to bridge this gap, such as the boundary spanning interpreter role. This is a role which I personally hope to evolve towards in the course of my career in FRM. In such a way, I can develop my knowledge of other professional ‘languages’ to help introduce FRM knowledge and priorities from the sector-specific side.

A final reflection in light of the new government elected in England in December 2019. The conservative party manifesto commits to ensure that “*flood defences will receive £4 billion in new funding*” (Conservative Party 2019) – likely influenced by flooding in November 2019 that occurred during the election campaign. Reflecting on this based on the findings presented in this research, my recommendation would be that although investment in defences is needed, it represents a very narrow view on FRM (often taken by some politicians). Instead additional investment is needed in collaborative processes that support continuous learning across current and future FRM and sector-specific professionals and communities, as well as adopting combinations of actor-, rule- and resource-based mechanisms that facilitate the realisation of integration in FRM for the long-term. In such a way, additional investment would build on the achievements already seen on partnership working for FRM in England and not risk undoing any of the work achieved so far. As poignantly described by Queen Elizabeth in her Christmas day message (2019) “... *it is often the small steps, not the giant leaps, that bring about the most lasting change*”. This quote reflects the essence of the findings on achieving integration in FRM presented in this thesis.

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List of Appendices

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Appendix A List of interviewees English Case Study

Cambridgeshire study area interviewees

Code	Affiliation	Date
CB-01	Environment Agency Great Ouse catchment representative	04/12/2017
CB-02	Councillor (Cambridgeshire)	07/12/2017
CB-03	Cambridgeshire LLFA representative	07/12/2017
CB-04	Catchment partnership representative	30/11/2017
CB-05	Internal Drainage Board representative	18/12/2017
CB-06	Cambridgeshire County Council Emergency Management (a) representative and (b) support staff	19/12/2017
CB-07	Middle Level Commissioners (a) representative and (b) support staff	05/01/2018
CB-08	Fenland District Council representative	05/01/2018
CB-09	Environment Agency, Great Ouse catchment, representative	11/01/2018
CB-10	Environment Agency, Great Ouse catchment, representative	11/01/2018
CB-11	Cambridgeshire Fire and Rescue service (a) Local Resilience Forum representative and (b) support staff	12/01/2018
CB-12	Cambridgeshire LLFA representative	19/12/2017
CB-13	Environment Agency Lincolnshire representative	16/01/2018
CB-14	Councillor (Lincolnshire)	16/01/2018
CB-15	Anglian Water representative	22/01/2018
CB-16	Nene Valley catchment partnership host*	23/01/2018
CB-17	Cambridgeshire LLFA representative	28/02/2018
CB-18	Highways England representative	21/01/2019

Leeds study area interviewees

Code	Organisation	Date
LD-01	Environment Agency Yorkshire representative	8/12/2017
LD-02	Leeds City Council, LLFA flood risk manager*	14/12/2017
LD-03	Aire and Calder catchment partnership host*	17/01/2018
LD-04	Environment Agency, Yorkshire, representative	17/01/2018
LD-05	West Yorkshire Combined Authority representative	17/01/2018
LD-06	Leeds City Council, Emergency Management (a) representative and (b) support staff	18/01/2018
LD-07	Yorkshire RFCC chair*	18/01/2018
LD-08	Councillor (Leeds)	31/01/2018
LD-09	Leeds City Council, Highway Authority representative	01/02/2018
LD-10	West Yorkshire Police, Local Resilience Forum representative	01/02/2018
LD-11	Environment Agency, Yorkshire, representative	02/02/2018
LD-12	Environment Agency Yorkshire (a) representative (b) support staff	02/02/2018
LD-13	Flood Action Group representative	02/02/2018
LD-14	Yorkshire RFCC representative	05/02/2018

National level interviews

Code	Organisation	Date
N-01	ADEPT representative (and Northamptonshire LLFA)	10/04/2018
N-02	Association of Drainage Authorities representative	13/06/2018
N-03	National Flood Forum representative	13/06/2018
N-04	OFWAT representative	10/01/2019
N-05	National Farmers Union representative	16/01/2019
N-06	Network Rail representative	18/01/2019
N-07	Environment Agency national representative	11/02/2019
N-08	DEFRA representative	06/02/2019
N-09	Anglian Water (former Defra) representative	12/02/2019
N-10	AECOM representative for Highways England	13/02/2019

N-11	Environment Agency national representative	15/02/2019
N-12	DEFRA representative	01/03/2019
N-13	Crown Estate representative	26/02/2019
N-14	Group interview with Environment Agency national representatives on (a) skills (b) national FCERM strategy (c) research (d) other	18/03/2019
N-15	Cumbria LLFA representative	08/03/2019

Feedback verification interviews

Code	Organisation	Date
VE_01	Lead Local Flood Authority representative	05/09/2019
VE_02	National Infrastructure Commission (a) representative and (b) support staff	12/09/2019
VE_03	International governance academic	17/09/2019
VE_04	Leeds LLFA flood risk manager (previously interviewed)*	20/09/2019
VE_05	Regional Flood and Coastal Committee representative	01/10/2019
VE_06	CIRIA representative	15/10/2019
VE_07	Deltares representative	24/09/2019

Those interviewees noted with an asterisk (*) agreed to have their full role presented for the purpose of this research (e.g. RFCC Yorkshire chair).

Additionally, for all interviewees the quotes presented in this study are not statements on behalf of the interviewee's organisation, instead they represent the opinions and experiences of the individual interviewees. Furthermore, given the dynamic nature of FRM, the quotes represent the views of the interviewees for the date at which they were collected.

Appendix B List of interviewees – Serbian Case Study

Code	Organisation	Interview Date
SB_01	Department of Civil Protection (DCP) head, Kraljevo*	14/09/2018
SB_02	RHMSS Royal Hydrological and Meteorological Service Serbia (a) representative (b) support staff	10/09/2018
SB_03	Red Cross (national level) disaster management representative	10/09/2018
SB_04	Serbia Water (national) representative	11/09/2018
SB_05	City Administration representative	12/09/2018
SB_06	City Administration representative	12/09/2018
SB_07	UNDP Serbia representative	12/09/2018
SB_08	Urban Landscaping (Public Firm) representative	13/09/2018
SB_09	National public utility company for roads representative	13/09/2018
SB_10	Environmental NGO representative	13/09/2018
SB_11	Media NGO representative	13/09/2018
SB_12	City Administration (Sector Leader) representative	14/09/2018
SB_13	Local public utility for water representative	14/09/2018
SB_14	Department of Civil Protection team representative	14/09/2018
SB_15	Department Civil Protection team representative	14/09/2018
SB_16	Civil protection commissioner focal point	14/09/2018
SB_17	Civil protection commissioner (a) focal point (b) volunteer (c) volunteer	15/09/2018
SB_18	Sector for Emergency Management – Ministry of Interior representative	17/09/2018
SB_19	University of Defence Belgrade representative	17/09/2018

Those interviewees noted with an asterisk (*) agreed to have their full role presented for the purpose of this research.

Appendix C List of Meetings English Case Study

Code	Region	Meeting	Location	Date
PO_1	Anglian	Anglian Central/ Great Ouse RFCC	Huntington	12/10/2017
PO_2	Anglian	Anglian Central/ Great Ouse RFCC	Huntington	17/01/2018
PO_3	Anglian	Anglian Northern RFCC	Peterborough	13/10/2017
PO_4	Yorkshire	Yorkshire RFCC	Leeds	20/10/2017
PO_5	Thames	Thames RFCC	London	07/07/2017
PO_6	Wessex	Somerset Flood and Water Management Partnership	Bridgwater	30/10/2017
PO_7	National	FCERM Stakeholder Forum	London	13/11/2017
PO_8	National	FCERM Stakeholder Forum	London	12/06/2018
PO_9	National	FCERM Stakeholder Forum	London	29/11/2018
PO_10	National	IDB 80th Conference (ADA)	London	16/11/2017
PO_11	National	Ripping up the Rule Book: Regeneration, Infrastructure and Delivering Flood & Coastal Erosion Risk Management CIWEM Rivers and Coastal Group	Leeds	13/06/2018
PO_12	National	FCERM National Strategy Working Group - Roles and Responsibilities	Birmingham	05/08/2018
PO_13	Anglian	Cambridgeshire FRM Partnership meeting	Huntingdon	04/12/2017
PO_14	Anglian	Economy and Environment Committee	Cambridge	07/12/2017
PO_15	Anglian	Combined authority meeting	Huntingdon	28/02/2018
PO_16	Anglian	LRF Severe weather working group meeting	Huntingdon	12/04/2018
PO_17	Anglian	Lincolnshire Flood Risk & Water Management Strategy Group	Lincoln	15/01/2018
PO_18	Anglian	Northamptonshire Flood and Water Management Operational Group Meeting (LFROG)	Northampton	23/01/2018

PO_19	Anglian	Lead Local Flood Authorities Regional meeting	Huntingdon	06/11/2018
PO_20	Leeds	Green Blue Infrastructure Strategy Priority 1 workshop	Leeds	02/02/2018
PO_21	Yorkshire	West Yorkshire RFCC Strategic Engagement Workshop	Leeds	08/02/2018
PO_22	Yorkshire	RFCC Programme and Investment sub-committee	Leeds	22/03/2018
PO_23	Northwest	Northwest Regional Flood and Coastal Meeting	Bury Manchester	19/01/2018
PO_24	Anglian	Cam-Ox Floods conference	Milton Keynes	13/03/2019
PO_25	National	Flood and Coast conference 2019	Telford	18/06/2019 – 20//06/2019
PO_26	National	FCERM working group	Birmingham	05/09/2019
PO_27	National	FCERM National Strategy stakeholder consultation	London	03/06/2019

Appendix D Sample interview guide – English

Case Study

INTERVIEW GUIDE

Interviewee Name:

Affiliation (organisational and other networks, previous is possible):

FRM OBJECTIVES AND POLICY/ PLANS

- ❖ Can you tell me about the organisation/institution/network you represent and your role?
- ❖ What are the **objectives** of your organisation (and network) and do you have a plan in place to achieve these?
- ❖ What **FRM related responsibilities/ objectives** does it have?
 - preventing new risk
 - reducing existing risk
 - managing residual risk
 - Wider sustainability/ growth objectives
- ❖ How is your organisation internally organised/ structured to achieve these objectives?
E.g. teams, sub-working groups
- ❖ Who are the key **FRM actors** do you interact/ work with to achieve your objectives?
E.g. Local authorities (country, district); IDBs; Environment Agency; engineering consultants; Utility providers; Transport providers
- ❖ What types of **interaction** do you have with these other actors (and/or networks)?
 - Meet at meetings/ events
 - ‘Pick up the phone’ easily if there are issues to resolve
 - Prepare joint policies/ planning documentation
 - Collaborate on projects (measures implementation) – joint funding/ or implementation support
- ❖ Are your (**FRM**) **objectives** (indicated through plans/policies) **aligned** with that of the other actors you work with?
 - Local Authorities Plan

- Emergency Plan
 - Water Companies Business Plans
 - Biodiversity Plans
 - Environment plans (EA medium term plan)
- ❖ Do you feel that your organisation/ network have significant influence to achieve its FRM objectives?
- ❖ Do you think any **policy-level improvements** could be made to improve your collaboration with other actors and implementation of FRM objectives?

ACTORS RELATIONSHIPS AND MECHANISMS

- ❖ Is your organisation part of or have connections to any actor networks? For example;
- Regional flood and coastal committee
 - Sub-regional FRM partnership
 - Local resilience forums
 - Local enterprise partnership
 - Catchment partnership
 - Coastal Groups
 - Others.
- ❖ Can you tell me more about the actor network you are part or (or represent)? For example;
- Goals and objectives
 - Activities (measures, planning, knowledge exchange, decision-making, networking)
 - Governance structure (chair, sub-groups/ task forces)
 - Participation (gaps, dominant voices...)
 - Length of establishment and frequency of meetings
 - Access to resources (for coordination and workplan activities)
 - Power dynamics/ fair decision-making process
 - Changes over time / learning points
- ❖ How would you describe your **relationship** with these actors (networks)? How has this changed though engaging in the network?
- ❖ What are the **benefits**/ outcomes of this network? For example;
- Socio, economic, environmental.
 - Time savings/ project delivery
 - Fair/ acceptable outcomes
 - Cost savings
 - Quality of outcomes
- ❖ Are there any **rule-based mechanisms** that enable you to interact with other actors?

{E.g. data sharing, power to request information, statutory consultee}

- ❖ Which of the above-mentioned networks do you **not have any interaction** with?
- ❖ What do you think is needed to **improve** your working relationships with other actors?
- ❖ What **financial resources** do you have available to implement these measures and how does your engagement in the networks support this? For example;
 - FCRM GiA
 - Levy Fund
 - Recovery funds
 - Emergency mgmt. funds
 - Taxes / community levies
 - Other..
- ❖ Do you find that specific measures are easier to get funding for than others? If so, please explain.
- ❖ What kind of influences do **joint funding arrangements** have on the outcome of the project/ measure? Please provide examples if possible.
- ❖ What improvements could be made to make access to financial resources better?

FRM INTERVENTIONS

- ❖ What **FRM interventions** are you implementing to achieve your FRM objectives?
- ❖ What was the process of **prioritising** these? *{steering group, data/evidence, resources, development, stakeholders}*
- ❖ Are you aware of other FRM interventions being implemented by other responsible actors? For example;
 - prevent new risk - changed land use,
 - reduce existing risk – alleviation schemes, natural flood management, asset elevation
 - manage residual risk – early warning, emergency management, property level protection, insurance
- ❖ How would you describe the balance (**diversification**) of FRM interventions in place (or planned)?
- ❖ How **flexible** do you think this is for future developments?
- ❖ Do you consider any **inter-dependencies** between these FRM interventions and others (not necessarily for FRM)?
- ❖ Can you identify any **synergies** between different interventions i.e. working better jointly? If so, please explain.

- ❖ Have you noticed any **unintended consequences** of the interventions? If so, please explain.
- ❖ Can you identify any measures that were implemented to **counterbalance** the side effects (negative externalities) of another measure? If so, please explain.
- ❖ Have you noticed any **co-benefits** (wider benefits for sustainable development/ economic growth) for the measures implemented (or expected for those planned)? If so, please explain.

KNOWLEDGE

- ❖ What **technical resources** (e.g. risk assessments, maps, and models) to you have access to and if needed, how could these be improved?
 - In house modellers/ technicians/ engineers
 - Use of consultants for risk assessments
- ❖ What kind of **data and evidence** do you have available for **monitoring** your plans?
- ❖ Do you access, collect, monitor or share data in **collaboration with other actors**? If so, how successful has that been *{E.g. EA, universities, IDBs}*
- ❖ How could access to technical resources (data, evidence, knowledge) be **improved**?

FOLLOW UP

- ❖ Can you recommend **anyone else** that I should speak with as part of my research?
- ❖ Do you have any **documentation** that would be helpful to share with me?
- ❖ Are there any **upcoming meetings** that would be beneficial for me to attend?

Appendix E Sample interview guide – Serbian

Case study

INTERVIEW GUIDE - CASE STUDY 2: SERBIA

Name:

Organization:

Position:

ACTOR RELATIONSHIPS

- ❖ What is your role in supporting flood risk management and/ or emergency response?
- ❖ Who are the main actors that you interact with?

Select that actor and discuss their relationship

- ❖ How would you describe the relationship? E.g. sharing information, joint projects, mandated, system dependencies/ reliance
- ❖ What mechanisms (formal or informal) do they use to **communicate** (before events)? How frequently? Are you **mandated** to do so?
- ❖ How easy is it for you to **interact**? E.g. meetings, coordinators
- ❖ What is the **level of formality** between actors? Cultural customs?
- ❖ Do you have **shared views** and a mutual understanding for FRM?
- ❖ What is the **level of trust** between organisations and what influenced this trust-building?
- ❖ Does the formal **organisational structure** influence your relationship?

INTEGRATED POLICIES

- ❖ What laws, policies and plans are currently in place?
- ❖ How aligned and consistent do you think the objectives in these plans across agencies are to bridge flood risk management and emergency response?

- ❖ What is the decision-making/engagement process in the development of the plans and interventions?
- ❖ Are the actions/ interventions aligned across different policies or plans?
- ❖ How do you think the policies and plans could be more integrated?

KNOWLEDGE

- ❖ How flexible/ **open are you (and/or other actors) to sharing data**, information and knowledge?
- ❖ What information is needed to improve response actions at the local level?
- ❖ What is the preferred/ feasible integrated risk information and early warning/forecasting system?
 - Forecasted hazards and risk-informed response plan
 - Forecasted hazards and impact-based warning thresholds (scenarios)
 - Forecasted impacts (e.g. inundation levels)
- ❖ What are the benefits of integrating risk information into response actions?
 - Identify safe areas and evacuation zones
 - Define evacuation routes
 - Asset review procedures to minimise damage

INTERVENTIONS

- ❖ What interventions or actions do you implement for flood risk management or emergency response?
- ❖ Do you have **joint projects** together/ activities with other actors? If so, please explain.
- ❖ What would be the **added benefits** of working jointly? E.g. access to information, stronger communication before/ during an event
- ❖ What are **the trade-offs/ conflicts** of interventions?
- ❖ Is it, or could it be more **efficient** to align interventions? Cost/ time savings, learning (for next experience).

INFLUENCING MECHANISMS

What mechanisms are available that hinder or enable integration efforts?

- Actor based: e.g.
 - Roundtables to promote and understand procedures for actions in disasters
 - Partnerships/ meetings – in preparation/event decision-making phase (formalised/ informal)
 - Coordinators/ boundary spanners
 - Coordination centres/ control rooms
 - Information sharing tools
 - Collaborative working arrangements
 - Policy based e.g. Cooperation Agreements; Statutory requirements to share data, request information
 - Resource based e.g. Joint funding mechanisms
- ❖ How effective are these mechanisms (what is currently working in practice and where are the bottlenecks)?
- ❖ What mechanisms do you think would be effective?
- ❖ Are there any new mechanisms being tested or planned?

Show the list of mechanisms to support answering and map which actor relationships they influence

Appendix F Consent form – English and Serbian

Case Studies

CONSENT FORM

Participant Identification Number:

Title of Project: Integrating flood risk management

Name of Researcher: Lydia Cumiskey

1. I confirm that I have read and understood the information sheet dated XXX for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason.
3. I agree that this form that bears my name and signature may be seen by a designated auditor.
4. I agree that my non-identifiable research data may be stored in National Archives and be used anonymously by others for future research. I am assured that the confidentiality of my personal data will be upheld through the removal of any identifiers.
5. I understand that my interview may be taped and subsequently transcribed.
6. I agree to take part in the above study.

Name of participant

Date

Signature

Researcher

Date

Signature

Appendix G Example participant information sheets

PARTICIPANT INFORMATION SHEET - INTERVIEWS ENGLAND

Study Title: Integrating flood risk management across sectors (January 2018)

You are being invited to take part in an interview as part of my PhD research at the [Flood Hazard Research Centre \(FHRC\) Middlesex University](#). The research is part of an EU Horizon 2020 Marie Curie; European Training Network project called [SystemRisk](#). The purpose of this research is to understand connections between different Flood Risk Management (FRM) actor networks e.g. Regional Flood and Coastal Committees, sub-regional FRM partnerships, catchment partnerships, local resilience forums, and local enterprise partnerships, to identify the outcomes and influence of such mechanisms to integrate and balance different FRM objectives - prevent new risk, reduce existing risk and manage residual risk, and wider sustainable development objectives.

You have been invited to participate in an in-depth interview due to your knowledge on flood risk management. This would involve an open discussion on a number of pre-defined topics. There will be space to adapt the flow of the discussion based on your experiences. By taking part you will support more research on integrated FRM; a pressing challenge for FRM professionals from institutional and management perspectives. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form, but you are still free to withdraw at any time and without giving a reason. An interview would be arranged at a convenient time for you taking between 60 and 90 minutes of your time. The interview will be recorded and transcribed unless you prefer not to have it recorded. You will also be given the opportunity to check the results if you wish to do so.

All information (transcripts, audio and comments) that is collected about you during the course of the research will be kept strictly confidential to all external parties (including other respondents) beyond the researcher and her supervisor. Any information about you which is used will have your name and address removed so that you cannot be recognised from it. You will not be identifiable from the data and the information will not be attributable to you. All data will be stored, analysed and reported in compliance with the Data Protection legislation (DPA, 1998). The data will be destroyed when no longer required.

This research will be published as part of a PhD dissertation and journal article. The results will be published before October 2019 through channels relevant to the FRM community at national, regional and global levels. The published results will be shared electronically with you upon completion. This study has been reviewed by the Middlesex University, School of Science and Technology, Natural Sciences Ethics Committee.

Please feel free to contact me at any point to clarify or discuss the research participation request.

Lydia Cumiskey | System-Risk PhD Researcher Flood Hazard Research Centre

PARTICIPANT INFORMATION SHEET – PARTICIPANT OBSERVATION ENGLAND

Study Title: Integrating flood risk management across sectors (October 2017)

I would like to request attendance at your meeting as part of my PhD research at the [Flood Hazard Research Centre \(FHRC\) Middlesex University](#). The research is part of an EU Horizon 2020 Marie Curie; European Training Network project called [SystemRisk](#) and is being completed in collaboration with [Deltares](#). Please take time to read the following information carefully to understand why the research is being done and what it will involve which will help you to decide if you would agree to me observing at your meeting.

The purpose of this research is to understand if flood risk management (FRM) can be integrated across sectoral decision-making and the role of inter-dependencies. To do this, the research aims to assess integration of FRM across sectors by analysing the interdependencies between interventions including their governing system and evaluate the advantages and trade-offs of integration.

I would like to request my attendance at your meeting due to the discussions being held related to FRM. This would involve me observing in the meeting and can sit silently in a part of the room where I will not disturb the other attendants. By taking part you will support more research on the topic of FRM integration across sectors; a pressing challenge for FRM professionals from institutional and management perspectives. If you agree to allow me to observe at the meeting you will be given this information sheet to keep and be asked to sign a consent form. If you decide to agree you are still free to withdraw at any time and without giving a reason. Please note anonymised data already collected may however still continue to be used as part of this study.

All information (notes, meeting agenda, minutes and comments) that is collected about the meeting during the course of the research will be kept strictly confidential to all external parties (including other respondents) beyond the researcher and her supervisor. Any information about you which is used will have your name and address removed so that you cannot be recognised from it. You will not be identifiable from the data and the information will not be attributable to you. All data will be stored, analysed and reported in compliance with the Data Protection legislation (DPA, 1998). The data will be destroyed when no longer required.

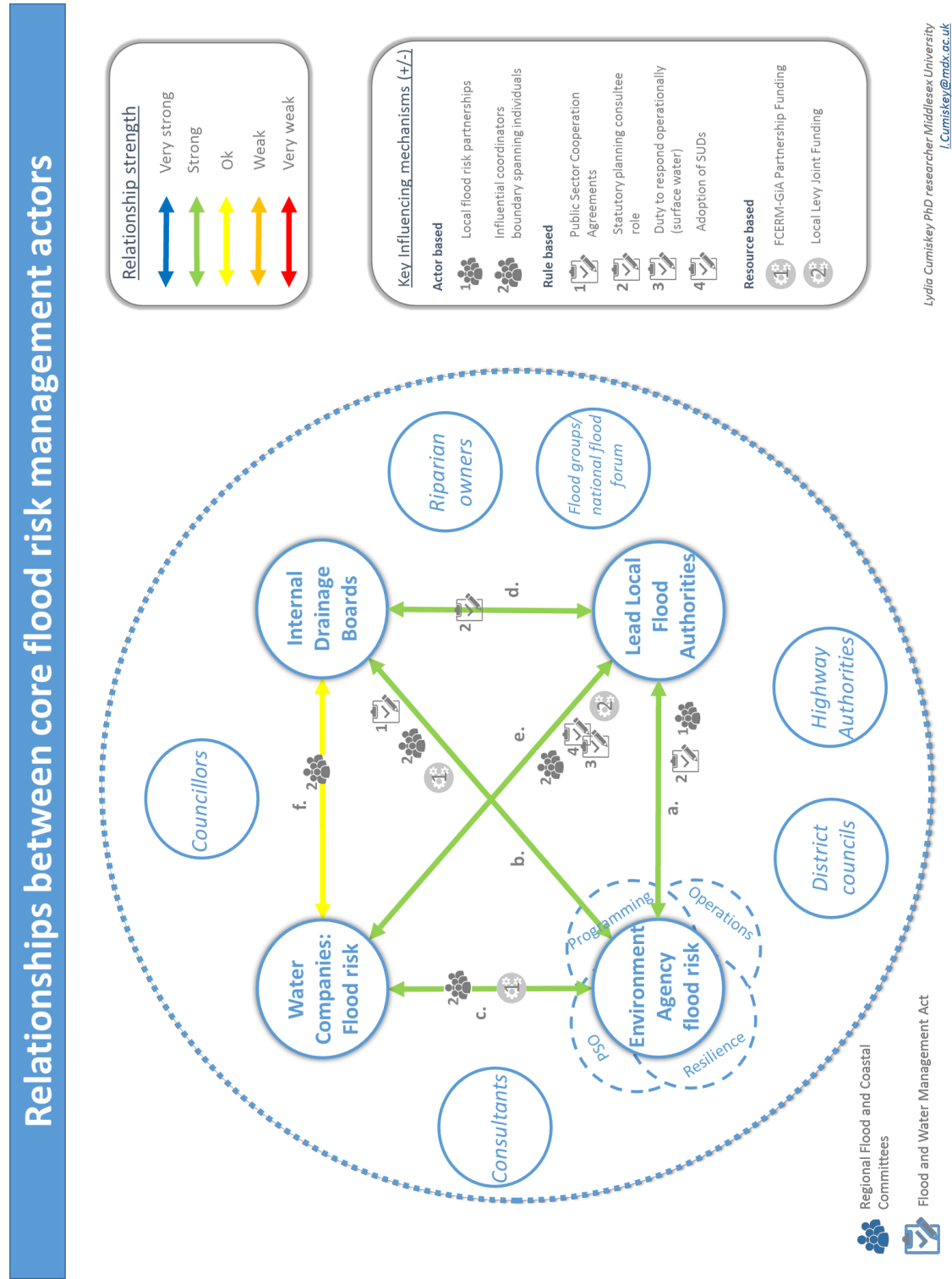
This research will be published as part of a PhD dissertation and journal article. The results will be published before October 2019 through channels relevant to the FRM community at national, regional and global levels. The published results will be shared electronically with you upon completion.

This study has been reviewed by the Middlesex University, School of Science and Technology, Natural Sciences Ethics Committee.

Please feel free to contact the PhD researcher or her supervisor at any point to clarify or discuss the research observation request.

Lydia Cumiskey | System-Risk PhD Researcher Flood Hazard Research Centre

Appendix H Feedback results from interactive exercise



Lydia Cumiskey PhD researcher Middlesex University
L.Cumiskey@mdx.ac.uk



Appendix I Example hierarchy of codes in NVivo

Element based codes example

Name	Files	References
Actors relationships	0	0
bonding	1	2
AWS - EA	3	5
Cllr. - EA	4	4
Cllr. - IDBs	1	1
Cllr. - LLFA	3	4
DC - EA	3	4
EA - EA internal	2	3
EA - LLFA	10	19
EA resilience - LLFA	2	7
HA - LLFA	3	6
HA - WC	2	2
IDB - AWS	5	8
IDB - EA	9	20
IDB - LLFA	5	7
LLFA - CC EM	5	7
LLFA - consultants	1	1
LLFA - Planning Authorities	6	10
LLFA - WC	5	7
bridging	7	9
WC - CC-EM	1	2
RFCC - CP	4	7
planning authorities - CP	1	1
met office - CC EA	3	3
LRF - WYFRMP	1	1
LLFA - Network rail	2	2
LLFA - LRF	1	1
LLFA - LNP	1	2
LLFA - Landowners	1	1
LEP - CP	2	2
IDB-LRF	4	6
1. Actor based mechanisms	35	106
Actor-based challenges benefits	2	2
collaborative workspace	2	2
Committee - Panel (Govt. led)	0	0
community groups	1	1
conferences	1	2
consultations	1	1
individual coordinators - boundary spann	19	44
joint project teams	1	2
joint training programmes	1	1
Knowledge sharing tools	4	9
Meetings	6	8
Multi-stakeholder partnerships	2	3
new organisations	4	6
newsletter communication	3	3
outsourcing	3	6
shared coordination (joint funded) staff	6	11
skills sharing	5	5
2. Rule based mechanisms	1	1
duty to respond	1	1
framework contracts	2	2
Consultation provision - statutory advisor	0	0
Statutory Tests and Assessments	7	9
cooperation agreements	0	0
maintenance arrangements	12	24
Regulations	0	0

Indicator based codes example

1. Actor based mechanisms	35	106
Actor-based challenges benefits	2	2
acting collectively regionally	1	2
boundaries	4	5
bringing people around the table	3	5
contact point	5	6
continuity	1	1
delivery	1	1
distributing time	3	3
engagement outcomes	1	1
flexibility	2	4
gaining and sustaining interest	5	6
general relationships	8	15
information sharing	5	6
internal coordination	1	1
joint project identification	3	4
keeping on top of implementation	1	1
keeping strategic	1	1
leadership	3	4
level of formality	1	4
limited staff - funding	7	8
managing personalities	1	2
new plans	1	1
organisational set up	1	4
participation selection	5	10
3. Resource based mechanisms	0	0
Funding Challenges	1	2
bid resources	4	4
bid timescales	4	4
coordination	1	1
dealing with austerity	5	6
delivery certainty	2	2
figure out who pays later	1	1
flexibility	2	2
funding criteria objectives	6	11
funding timescale	5	8
future financial uncertainty	2	3
geography mismatch	1	1
private vs public	2	2

Appendix J Published research article

Research

A framework to assess integration in flood risk management: implications for governance, policy, and practice

*Lydia Cumiskey*¹, *Sally J. Priest*¹, *Frans Klijn*^{2,3} and *Meri Juntti*⁴

ABSTRACT. Over decades the concept of integration has been promoted to enhance alignment between policy domains, and to manage trade-offs and maximize synergies across management practices. Integrated approaches have the potential to enable better outcomes for flood risk management (FRM) and society as a whole. However, achieving integration in practice is a recurring challenge, especially for FRM where multiple actors need to work together across fragmented policy domains. To disentangle this complexity of integration, a framework is proposed for assessing integration and identifying different degrees of integration. This framework is based on evidence from a literature review, 50 interviews with FRM-related professionals in England, and participant observation at 24 meetings relevant for FRM. The framework sets out the context of integration, assesses the governance capacity for integration through the strength of relationships between different types of actors (bridging, bonding, and linking) and the mechanisms (actor-, rule- and resource-based) that influence them, and the realization of integration in practice through knowledge, policies, and interventions. The framework is applied for FRM in England and used to identify degrees of integration: high, intermediate, low, and minimal. An important characteristic of the framework is the interconnectivity between the governance capacity and realization of integration. The framework provides further theoretical insights into the concept of integration, while offering an approach for researchers, policy makers, and practitioners to recognize current degrees of integration in FRM and identify the critical elements for improvement. It is recommended that further research and practice-based applications of the framework are completed in different geographical and institutional contexts. Specifically, such applications can create further understanding of the interactions and dependencies between elements of the governance capacity and realization of integration.

Key Words: *assessment framework; governance; integrated flood risk management; integration; policy*

INTRODUCTION

Integration is a term used frequently within flood risk management (FRM) policy making and practice because it involves multiple actors across sectors and levels of decision making (WMO 2009, Samuels et al. 2010). Integration is increasingly being promoted to manage “wicked problems,” those complex policy problems subject to uncertainty, involving multiple actors with often diverging interests (Head 2008). These range from adapting to climate change and reducing disaster risk (Forino et al. 2015), to urban/spatial planning (Eggenberger and Partidário 2000, van Herk et al. 2011), or achieving sustainable development (Stafford-Smith et al. 2017). These complex challenges cannot be solved in isolation; and therefore an integrated approach to managing them is likely to prove to be more successful. Such an integrated approach focuses on understanding the interdependencies across sector objectives, and working within governance structures to manage them. Addressing challenges, such as FRM typically sitting outside one sector’s remit, in a systematic way can ensure the wider causes and potential solutions are recognized. By doing so, integration aims to achieve more by jointly aligning objectives and policies, reducing duplication, managing trade-offs, and promoting synergy across interventions (Underdal 1980, Stead 2008, Candel and Biesbroek 2016).

However, integration has been criticized as acting as a mirage or an illusion of something that is desirable but difficult to achieve, for reasons such as time-consuming multiactor processes or blurred responsibility boundaries (SurrIDGE and Harris 2007, Walker et al. 2014). Thus, attempts to achieve integration often

fail (Williams and Sullivan 2009). Nevertheless, it is generally agreed that integration is needed to overcome siloed, fragmented (Gilissen et al. 2015), or disintegrated (Russel et al. 2018) approaches to policy making, which often result in negative side-effects for other policy domains. Therefore, it is expected that some degree of integration is needed for actors to work collaboratively within existing governance structures to generate knowledge and policies that maximize synergies and manage trade-offs across FRM and sector-specific goals. Here we assume that integration is desirable because it has potential to yield better outcomes for FRM although is not easy to achieve.

There are a range of ways the term integration is being interpreted and used in research and practice. Examples include, describing the connections between actors at different levels or across sectors (Russel et al. 2018), science and policy (van den Hove 2007), social and technical perspectives (Brown and Damery 2002), or different modeling tools (Anselmo et al. 1996). Furthermore, integration is often an implicit goal when using other terms, for example, mainstreaming, emphasizing the connection of day-to-day activities (Russel et al. 2018), or intersectoral and interorganizational collaboration (Foster-Fishman et al. 2001). Additionally, integration is often used lightly, for example, stuck onto reports or research (e.g., Park et al. 2013) to increase their appeal without specifying the added value compared to regular policy making or management. Therefore, confusion can emerge to its actual meaning. To disentangle this complexity, we develop a framework to assess integration and identify different degrees of integration. The applicability of the framework is demonstrated for FRM in England, highlighting examples for

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different elements of integration and deriving the achieved degree of integration.

CONCEPTUALIZING INTEGRATION

To consider integration in the context of FRM, both the theoretical and practice-based constraints on achieving integration need to be considered. From the theoretical side, integration has been connected to the way actors balance their multiple overlapping interests to achieve a desired outcome, such as FRM (Underdal 1980, Stead 2008, Candel and Biesbroek 2016). In doing so, there are multiple integration challenges that actors can aim to address, e.g., across specific sectors. Furthermore, the understanding of the relationships between such actors and their governance arrangements has formed a central part of the theory surrounding integration, especially drawing on governance literature. Renn's (2008) definition of risk governance focuses on the complex web of actors, rules, conventions, processes, and mechanisms involved. Similarly, but placed in the context of flood risk governance, Alexander et al. (2016) emphasize the need for actor networks, rules, resources, discourses, and multilevel coordination mechanisms to pursue FRM. Other governance literature draws upon the importance of building relationships through theories of polycentric governance (Ostrom 2010), collaborative governance (Emerson et al. 2012), multilevel governance (Newig and Fritsch 2009), and network management (Agranoff and McGuire 2003). Embedded within this governance literature is the importance of mechanisms that strengthen or constrain actors' ability to cooperate, coordinate, collaborate (Keast et al. 2007, McNamara 2012), or enable integration (Stead 2008, Visseren-Hamakers 2015). The level of connectedness between these actors has been assessed by identifying the availability and strength of (bridging) mechanisms connecting actors, e.g., partnerships or regulations (Stead 2008, Gilissen et al. 2015). Furthermore, Koop et al. (2017) explain governance capacity as the key set of governance conditions that enable effective change, such as enabling integration. Reflecting on these theoretical insights, we identify one dimension of integration as the governance capacity for integration, derived through elements representing the strength of relationships between actors, and the mechanisms that influence them.

In addition to the governance capacity dimension, integration needs to be realized in policy and practice with tangible outcomes for FRM. Various discourses around integration have played a role in getting integration on policy agendas and demonstrating the practical need for more integration to achieve policy outcomes. As such, in Europe policies have driven more formalized approaches to integrated water resources management through the Water Framework Directive (WFD; 2000/60/EC) and integrated FRM through the Floods Directive (2007/60/EC). Similarly, global policies such as the Sustainable Development Goals call for policy coherence across sectors (OECD 2015). From a practical perspective, integration connected with management practices dates back to the 1980s for integrated river basin or water resources management (Glasbergen and Klijn 1991) as promoted by the Global Water Partnership (since the Dublin Principles in 1992). Over time, however, there have been significant changes in popularity of the term integration, largely because of its ambiguity. For FRM these variations include sustainable FRM, e.g., the IMRA-SPONGE project (Hooijer et al. 2004), integrated flood management from the World Meteorological Organization

concept paper (WMO 2009), integrated FRM within the Floodsite Project (Samuels et al. 2010), and toward comprehensive FRM (Klijn and Schweckendiek 2013). Similarly, these management approaches argue the importance of taking a systems approach to FRM, looking at the catchment as a whole to understand the positive and negative influences of interventions accounting for the spatial and temporal complexity across boundaries (Hall et al. 2006, WMO 2009, van Herk et al. 2015, APFM 2017). Additionally, emphasis is placed on selecting a mix of interventions that manage trade-offs and maximize the multiple benefits between objectives (GWP 2000, WMO 2009, Sayers et al. 2014, Challies et al. 2016, APFM 2017). Furthermore, it is recognized that the generation of joint knowledge or evidence bases across multiple actors forms a critical step in helping actors to work together to develop policies and implement interventions (Underdal 1980, Newig and Fritsch 2009, Evers et al. 2012, Challies et al. 2016). Combining these insights from integration in practice we identify the realization of integration as another dimension of integration, derived through the joint, aligned, or integrated knowledge, policies, and interventions generated.

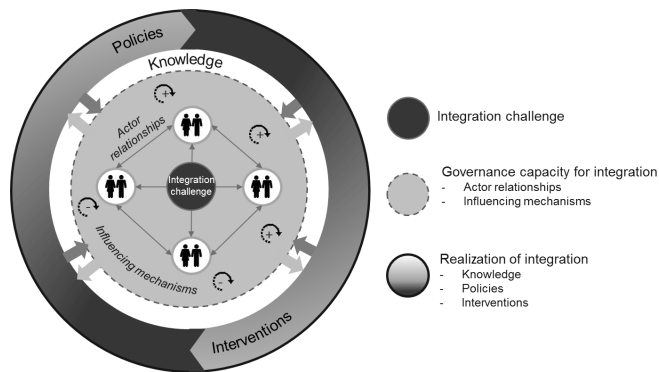
The next point to emphasize is the dynamic nature of these dimensions of integration and how the associated elements interact with one another, an important characteristic of integration also identified by Candel and Biesbroek (2016). This is conceptualized in Figure 1 and forms the basis for the assessment framework. The inner-most circle (dark grey) represents the integration challenge that actors' work toward achieving in a particular context, while the next inner circle (light grey) represents the governance capacity for integration including the relationships between the actors and their influencing mechanisms. The outer two circles represent the realization of integration through policies and interventions (black-grey circle), and knowledge (inner white circle), which acts as the interface between the capacity and realization of integration. Importantly, the flow between each of the elements is demonstrated by multiple arrows. For example, strengthened relationships can lead to improved mechanisms and continuously influence the development of integrated knowledge, policies, and interventions as one informs the other. Furthermore, the implementation of joint plans can lead to more multibenefit schemes being implemented, which further improves actor relationships and drives improvements to mechanisms. In contrast, limited governance capacity for integration can jeopardize the ability to deliver integrated policies or interventions for a particular challenge. Overall, we consider that the elements representing the capacity and realization of integration need to be assessed side-by-side because of their interconnected nature. Other conceptualizations of integration using, e.g., a horizontal continuum (Keast et al. 2007, McNamara 2012), a triangle (Stead 2008), or a prism (Parkes et al. 2010), do not emphasize these dynamics. Details on how each of the dimensions and associated elements are assessed within the framework, their interconnectivity with one another, and how they are used to identify degrees of integration, are explained in later sections of the paper.

METHODOLOGY

An assessment framework is developed based on the conceptualization of integration emerging from a literature review, along with in-depth interviews, participant observation, and document review for FRM in England. The data collection

thus included in-depth interviews between November 2017 and March 2019 with professionals in England at the national level ($n = 15$) and at the local level ($n = 35$), in two case study areas in the Anglian and Yorkshire regions. These professionals ranged from those working directly on FRM issues (including but not limited to Environment Agency [EA], lead local flood authorities [LLFA], internal drainage boards [IDB]), to sector-specific actors (including but not limited to infrastructure providers, water companies, environmental NGOs). The key themes in the interviews broadly covered the elements of integration identified in the literature review. This included the strength of relationships between FRM key actors and others, the influence of mechanisms, e.g., partnerships, regulations, and funding, knowledge development, alignment between FRM and sector-specific policies, and interaction between FRM and sector-specific interventions.

Fig. 1. Conceptualization of the interconnectivity between the dimensions and elements of integration.



In addition to the interviews, FRM related meetings were attended ($n = 24$) to gain further insights into working arrangements between actors. These included multistakeholder partnership meetings at the national level, e.g., national FRM stakeholder forum led by the EA, at the regional level, e.g., regional flood and coastal committees (RFCC), and at the local level, e.g., local FRM partnerships led by LLFAs. These primary data were further supplemented with secondary data including review of FRM specific plans ($n = 15$), e.g., Regional Flood Risk Management Plans, Local Flood Risk Management Strategies, and sector specific plans ($n = 20$), e.g., National 25 Year Environment Plan, Regional River Basin Management Plans, and Local (development) Plans. These plans were selected based on those identified in the interviews and meetings both locally and nationally, and to ensure broad coverage of sectors. Furthermore, additional guidance documents, available meeting minutes, and associated documents ($n = 35$) were reviewed.

The interviews and observation notes were transcribed, and coded using thematic analysis (Fereday and Muir-Cochrane 2006). The research followed a mix of deductive and inductive coding. Although the elements of integration were identified from the literature (deductively), they were then further verified based on the inductive coding of the evidence collected. Similarly, the indicators for assessing each of the elements were initially scoped from the literature but then further refined based on inductive coding.

FRAMEWORK FOR ASSESSING INTEGRATION

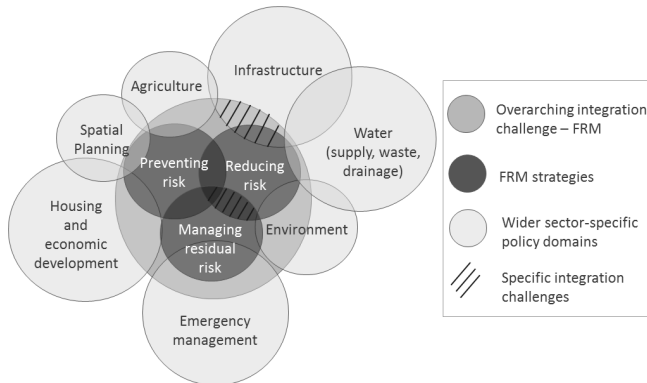
Integration context and challenge

The starting point for integration is jointly working toward common goals, such as FRM, as a means to support society as a whole. Considering that flood risk governance arrangements will be fragmented in different ways (Gilissen et al. 2015), some form of integration is needed between different sectors, types of flood risk, and across different boundaries, e.g., geographical, administrative, or catchment (Underdal 1980, Stead 2008, WMO 2009, McNamara 2012). However, this challenge can be approached in an overarching or piecewise manner. Therefore, it is important to understand the specific integration challenges because they will likely vary from one governance context to another.

To understand the integration challenges for English FRM, we first briefly introduce this contextual background. In England there is a broad range of actors responsible for different aspects of FRM identified as the risk management authorities (RMAs), as specified under the Floods and Water Management Act (UK Government 2010). These actors include the EA, based regionally and nationally, responsible for managing flooding on main rivers; LLFAs responsible locally for ordinary water courses and surface water; IDBs responsible for ordinary water courses (where required); water companies responsible for sewer flooding; and highway authorities responsible for surface water runoff from highways. FRM in England engages multiple strategies to manage flood risk, including preventing new risk (spatial planning), reducing existing risk (flood defense and mitigation), and managing residual risk (preparedness, response, and recovery) using the categorization from the United Nations Office for Disaster Risk Reduction (UNISDR 2015) and Hegger et al. (2016). The key cross-cutting policy sectors with FRM include the environment sector also led by the EA, the water sector (resources, wastewater, drainage) falling mainly under water companies, emergency management led by the Cabinet Office under the Civil Contingencies Act, along with housing, economic growth, infrastructure, and agricultural sectors, all influencing FRM.

Given the fragmentation between sectors, both for those responsible for different sources of flood risk, different FRM strategies, and wider sector-specific responsibilities, there are multiple layers that require integration for FRM in England. Figure 2 approximately highlights the potential areas for integration given the different FRM strategies (central circle) and sector-specific policy domains (outer circles) for FRM in England, as well as the extent of the influence (size of circle). For example, preventing future risk was found to overlap with housing, infrastructure development, and economic development at large while reducing existing risk was found to overlap with water supply (e.g., multipurpose reservoirs) and biodiversity preservation (e.g., river dredging regimes). Many other overlaps are also possible but difficult to present in one figure (e.g., between agriculture and risk reduction due to the provision of flood storage areas). Any one of these overlaps, or combinations thereof, can form integration challenges. Additionally, an integration challenge can be seen when managing different sources of flood risk. For example, aligning the work of the EA on main rivers, IDBs on ordinary watercourses, and water companies for sewer flooding.

Fig. 2. Visualization of possible areas for integration between flood risk management (FRM) and other sector-specific policy domains, approximated for England.



In practice, certain integration challenges for FRM may be prioritized over others because of urgency, e.g., recent floods, local conditions, e.g., catchment characteristics and types of flood risk, or combined institutional responsibilities, e.g., water companies in England are responsible for surface water runoff from sewers and water supply. Therefore, an assessment of integration could be in the form of a detailed assessment for a specific integration challenge, e.g., across specific sectors or FRM strategies, or a more broad overarching assessment across multiple sectors, sources of flood risk, and FRM strategies. Considering the wide range of integration challenges for FRM in England, the interest and willingness of the FRM community to enable integration across multiple sources of flood risk and sectors was strongly identified. Therefore, the assessment framework could be applied in more detail for specific integration challenges. However, for the purpose of this paper, broader insights on integration for FRM in England are provided to demonstrate the general applicability of the framework.

Governance capacity for integration

Actor relationships

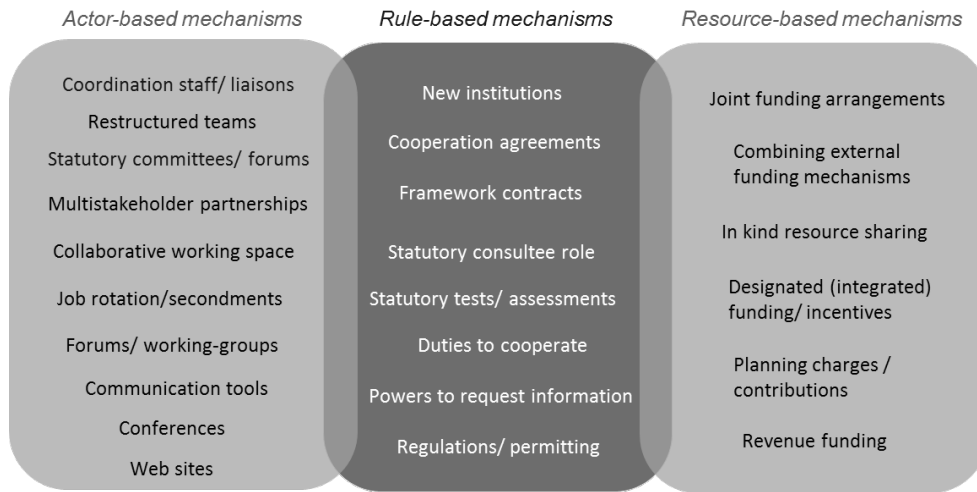
The governance capacity for integration was found to be strongly related to the number of actors involved and the strength of their relationships (Gilissen et al. 2015, Candel and Biesbroek 2016). Therefore, based on the literature and the results from the interviews, we propose mapping out the different actors and identifying if they have strong, medium, or weak relationships focusing on two key indicators: (1) mind-set alignment and (2) communication intensity. Furthermore, it is important to assess the strength of the relationship from both actors' perspectives (Granovetter 1973, Reed et al. 2009). We define actors as organizations or teams within organizations if multiple roles exist, rather than the individuals. Instead of identifying trust as an indicator itself, here it is assumed that when actors have aligned mind-sets and strong interaction then they will build trust with one another.

First, literature highlights that the way the different actors perceive or frame the problem (causal beliefs, cognitions, or frames of reference) and their values (norms, interests, and

purposes) will influence their ability to work together (Underdal 1980, Keast et al. 2007, McNamara 2012, Thissen and Walker 2012, Candel and Biesbroek 2016). This was evident in the interviews with FRM professionals in England who reinforced the importance of aligning mind-sets and building shared understanding of FRM between key actors within FRM and across sectors, before relationships could grow. Generating this shared mind-set was found to be dependent on the knowledge the actors have on the system interdependencies, their ability to address the problem, the organizational culture, and their willingness to work together. The second indicator found to affect relationship strength was the interaction and communication between actors, as identified in the literature by Candel and Biesbroek (2016) and Gilissen et al. (2015). The findings from the interviews and meeting observations with FRM actors indicated that the strength of the interaction was dependent upon the type of communication, either one way or two-way and the level of formality, the frequency and duration of communication, e.g., staff availability for interaction at meetings or bilateral exchange, and the resulting quality of the interaction, e.g., sharing data and resolution of issues. To highlight an example of both indicators for FRM in England, a water company (in the Anglian region) was found to have a clear understanding of system dependencies combined with a proactive organizational culture, and willingness to work in partnership, alongside improved communication through identified contact points and attendance at partnerships. Together, as evidenced by both the water companies and the other RMAs, this was found to enable them to build strong relationships with partners and to build trust, in particular with the LLFAs and the EA.

Next, different relationship types are distinguished, bonding, bridging, and linking, as used by Gittel and Vidal (1998) and Szreter and Woolcock (2004) for identifying social capital. For relationships between actors responsible for FRM, they are expected to need more bonding relationships because they are similar in some form (Putnam 2000). In comparison, bridging relationships will be needed for connecting FRM and sector-specific objectives because they are dissimilar in a demonstrable fashion (Szreter and Woolcock 2004), e.g., representing different sector interests. Linking relationships are needed when connecting across spatial boundaries, e.g., national, regional, local, to individuals who have power over them (Szreter and Woolcock 2004), e.g., local authorities and communities. In the case of FRM in England, the interviews and meeting observations showed that the bonding relationships between RMAs have greatly improved since the implementation of the Floods and Water Management Act 2010 (UK Government 2010) and the move toward partnership working, in particular between the EA, water companies, IDBs, and LLFAs. The bridging relationships were found to vary for different sectors, e.g., for environment the push toward natural flood management (NFM) and the catchment-based approach helped to bring together environmental NGOs and RMAs. However, there remains a bigger gap to bridge between those working on housing and infrastructure development with FRM. The linking relationships between the community and RMAs were found to be dependent on the presence and strength of flood groups and local community leadership.

Fig. 3. Overview of actor-, rule-, and resource-based mechanisms.



Influencing mechanisms

The presence and strength of different mechanisms will positively or negatively influence the strength of actor relationships, and vice versa (Stead 2008, Gilissen et al. 2015), and thus the governance capacity for integration. These mechanisms are named and characterized differently across the literature: bridging mechanisms grouped into transfer, coordination, and cooperation mechanisms (Gilissen et al. 2015); policy cooperation, policy coordination, and policy integration mechanisms (Stead 2008); and procedural instruments that facilitate coordination (Candel and Biesbroek 2016). Similar across these different characterizations is an increasing scale through which different mechanisms support different levels of joint working across actors. However, the interpretation of the terms coordination and cooperation can cause confusion (McNamara 2012), thus a more simplified descriptive categorization was sought. The policy arrangements approach (Arts et al. 2006) distinguishes actors, resources, rules of the game, and discourses, and emphasizes the interconnected nature between them. Therefore, the simplified categorizations of actor-, rule-, and resource-based mechanisms were found to be useful to delineate such categorizations, as shown in Figure 3. However, discourses were not included as a type of mechanism because, although they can influence integration over time, they are less tangible than actors, rules, and resources.

Actor-based mechanisms are identified as those that improve actors' interaction, communication, and knowledge exchange. As depicted in Figure 3, these include intergovernmental committees, working groups or coordinating councils (Agranoff 2006, Stead 2008), multistakeholder partnerships or platforms (Pattberg and Widerberg 2016), conferences (Stead 2008), collaborative working arrangements (Stead 2008), human resource policies such as secondments or job rotation (Stead 2008), joint planning processes or working groups (Freude am Fluss 2007), cross-cutting units or interdepartmental teams (Stead 2008, Candel and Biesbroek 2016), and individual staff positions or coordinators who act as boundary spanners (Agranoff 2006, Williams 2011). Examples of all the above actor-based mechanisms were

identified for FRM in England either through the interviews or through observation in meetings. Here, however, there is only space to detail the more interesting examples. The local FRM partnerships led by LLFAs were found to be very successful at aligning mind-sets across RMAs and building strong relationships, however, there is still room to improve the breadth of members included to align different objectives and actions, for example by also including local enterprise partnerships (LEP), catchment partnerships, and community representatives. Similarly, the research found that statutory RFCC offered a good platform for knowledge exchange between actors but have potential to be further improved by drawing connections with other local partnerships and groups, as identified by Benson et al. (2016).

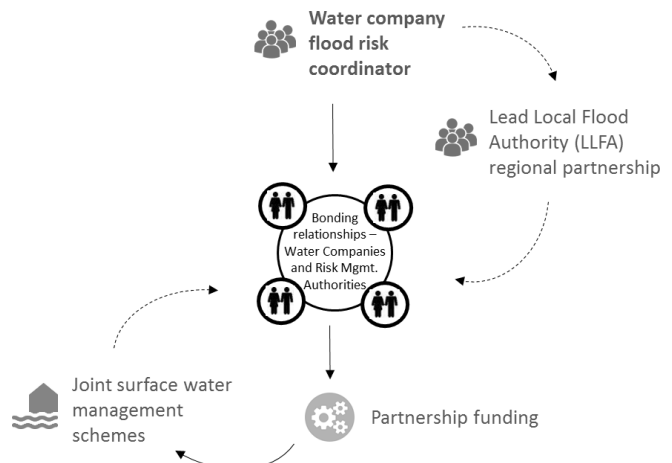
Rule-based mechanisms are identified as those that determine how actors must interact, for example, powers to request information or duties to cooperate (Gilissen et al. 2015), statutory consultation requirements (Gilissen et al. 2015, Candel and Biesbroek 2016), statutory tests/impact assessments (Stead 2008, Gilissen et al. 2015), cooperation agreements or memorandums of understanding (Agranoff 2006), framework contracts, and standards/regulations setting (Candel and Biesbroek 2016). Again, these mechanisms were identified for FRM in England. As a result of the Flood and Water Management Act (UK Government 2010) new rules were established for FRM, including redistributing roles and responsibilities for different types of floods. LLFAs, for example, now act as a statutory consultee on planning decisions in areas at risk of surface water flooding, and formalizing interaction between actors including a duty to cooperate. However, it was identified by some interviewees that additional RMAs need such a statutory role to influence development. Through interviews with IDBs and the EA, the public sector cooperation agreements were identified as a very useful mechanism to facilitate shared maintenance programs across main rivers and ordinary watercourses. Consultation processes ensure some form of multiactor engagement is completed for policy making, although the design and resulting effectiveness of such processes can vary (Newig and Fritsch 2009).

A positive example we observed as having an intensive multistakeholder consultation, is the National Flood and Coastal Erosion Risk Management Strategy draft published in August 2019 (Environment Agency 2019). It engaged 150 individuals across 90 organizations in different working groups before the online formal public consultation, which received 400 external responses.

Resource-based mechanisms are identified as the funding arrangements that help actors to implement joint actions in the form of operational activities, projects, or programs of work, including their ability to hire and train staff, for example, overarching funding programs (Stead 2008), combined external funding sources, financial incentives such as tax deductions (Candel and Biesbroek 2016), financial contributions, e.g., from developers, or in-kind resources sharing (such as staff time). For FRM in England, the interviews showed that “partnership funding” (Environment Agency 2012) was a successful mechanism in improving relationships between the EA, LLFAs, IDBs, and water companies through the process of jointly defining and funding projects. However, the mechanism currently fails to sufficiently recognize the benefits for infrastructure, business, and the environment, thus failing to build relationships across those sectors. Furthermore, the misaligned timescales and criteria (or “strings”) for obtaining external funding such as the “economic growth funding,” were found to hinder joint action between FRM actors and those dealing with economic growth, i.e., LEP. Another local funding mechanism, the local levy, collated across all local authorities in the RFCC area was found to offer flexibility to fund smaller projects, e.g., for property resilience, and to hire individuals to work in partnership to develop funding bids or portfolios of projects. The nationally allocated funding of £15m for NFM in 2017 (Defra 2017) was recognized by interviewees to strongly improve relationships between LLFAs, EA, environmental NGOs, and universities to generate new knowledge and jointly test NFM interventions. Furthermore, the presence and strength of mechanisms was found to vary depending on local conditions. For example, flood events in Leeds led to additional national funding being available to support local FRM partnerships at the catchment scale.

This interconnected nature of the actor-, rule-, and resource-based mechanisms links to the broader agency-structure debate (Hay 1995, Williams 2011) whereby there is an interplay between individual agency and the more formalized mechanisms through which they operate. For example, the importance of the newly formed water company flood risk coordinators (in the Anglian region) was found to be pivotal in building stronger relationships across RMAs to utilize partnership funding opportunities and thus the delivery of joint surface water flood management schemes. This is demonstrated in Figure 4 (solid arrows). Furthermore, the proactive and motivated characteristics of these coordinators further enhanced their capacity to drive additional improvements, for example, through establishing a new regional LLFA partnership, which then further improved relationships between actors, as did the implementation of joint schemes (shown by the dashed arrows in Figure 4). This demonstrates the interplay between individuals and their ability to influence positively other relationships by utilizing mechanisms at their disposal or developing new ones.

Fig. 4. Demonstration of the interplay between mechanisms and relationships.



Realization of integration

Knowledge

Extracting and developing knowledge across actors acts as a stepping stone to develop a common view of the problem to aid joint-decision making (Underdal 1980, Newig and Fritsch 2009, Challies et al. 2016). It can improve communication exchange between actors, offer opportunities to bring new actors on board, and help to align mind-sets for future plans and projects (Evers et al. 2012). Therefore, the process of developing such knowledge builds capacity for integration, however, we focus on knowledge as a tangible output for the realization of integration in practice but recognize the influence on building capacity for integration. As identified through the interviews, joint knowledge in the sphere of FRM is recognized as collaborative modeling, baseline studies and assessments, e.g., flood mapping/risk assessments, societal cost-benefit analysis (CBA), procedural frameworks/protocols, or jointly developed guidance methodologies on implementing policies or interventions. The following indicators are identified to assess the strength of the knowledge available to support integration.

- Presence of knowledge jointly developed by and accessible to multiple actors;
- Use of the knowledge to influence other elements (relationships, mechanisms, policies, interventions).

The importance of developing risk models jointly by multiple actors was identified during the interviews where water companies, IDBs and the EA, and universities were found to work together to complete investigations to develop joint business cases. Another example is the Working with Natural Processes evidence directory, which was codeveloped with the research community, other public bodies, and NGOs to build evidence to support the implementation of NFM interventions in England and Wales, thus influencing the realization of integration in practice (Environment Agency 2017). Joint knowledge was also found to be a result of learning from a history of implementing specific

policies or interventions by multiple actors, for example, the SuDS (Sustainable Drainage Systems) manual in England (Woods-Ballard et al. 2015) which supports further implementation of SuDS interventions. However, the results from the interviews showed that there are still some knowledge gaps to align FRM and environmental objectives, such as the lack of agreed methodologies for performing cross-sectoral societal CBA.

Policies

Policies can range from plans at different boundaries, e.g., geographical, administrative, and catchment, or programs of planned work. Policies that are aligned and coherent both across FRM related policies, e.g., different sources of flood risk, from national to local levels, and with other sector-specific policies are more integrated. The following indicators were identified to assess the strength of policies to enable integration, demonstrated below through examples from FRM in England.

- Availability of new/joint plans (Underdal 1980, Candel and Biesbroek 2016);
- Alignment of objectives and interventions across plan boundaries (Underdal 1980, OECD 2015, Candel and Biesbroek 2016);
- Consistency of time frames for preparation, monitoring, and renewal (Stead 2008, OECD 2015).

For the first indicator, relating to the availability of joint or overarching plans, from a FRM perspective, new integrated catchment-based FRM plans have been developed on a case-by-case basis in England usually after significant flood events, for example, the Cumbria Flood Action plan emphasizing a catchment-based approach and partnership with communities (Environment Agency 2016). Whereas, from a sector-specific perspective, the Network Rail Weather Resilience and Climate Adaptation Strategy (2017–2019) and Route Climate Adaptation Plans (Network Rail 2017) were identified as a good example of a specific plan integrating FRM objectives with rail infrastructure planning. Additionally, from the environment sector, the national 25 Year Environment Plan (HM Government 2018) was identified as a good example of a national overarching plan that strongly emphasizes the importance of aligning environment and FRM objectives nationally and locally.

The second indicator relates to the alignment of objectives and interventions across FRM and sector-specific plan boundaries, e.g., administrative, geographical, catchment, flood source. In particular sector-specific plans will likely have different boundaries, e.g., economic or growth areas in comparison to catchments and therefore extra effort is needed to consider the overlaps in objectives and interventions. The extent of alignment between FRM and sector-specific plans was found to be limited by the engagement of representative actors, e.g., in local FRM partnerships or the RFCC meetings. In England the water companies were found to actively engage with LLFAs and the EA to identify opportunities for joint interventions in their asset management plans, for example, contributing to a flood alleviation scheme that also protects water company assets and is informed by joint studies and funded jointly by local authorities and water companies.

For the third indicator, the consistency of the time frames for preparation, monitoring, and renewal, overall the evidence from the interviews showed the challenges to connect the array of plans especially considering their scattered, “out of sync” time frames. For example within FRM, the local FRM strategies and regional FRM plans were prepared under different time lines making it difficult to align monitoring efforts. However, where time frames are more consistent, as is the case with Water Framework Directive and Floods Directive related plans, interviews with the EA revealed that the upcoming revisions of the regional FRM strategies and river basin management plans aim to be more strongly aligned compared to existing plans.

Interventions

Interventions can range from small-scale actions to large-scale investment projects or maintenance programs. Interventions that actively account for the interactions with other FRM and sector-specific objectives and interventions are more integrated. The following indicators are identified to assess integration across interventions, demonstrated below through examples from FRM in England.

- Maximized synergy (WMO 2009, Challies et al. 2016);
- Managed trade-offs and side-effects (WMO 2009, Sayers et al. 2014, APFM 2017);
- Maximized efficiencies (Sayers et al. 2014, Alexander et al. 2016).

Depending on the integration challenge, synergies should be maximized across FRM and sector-specific interventions. The interviewees identified the importance of FRM actors working together to capture synergies within FRM interventions by looking across different sources of flood risk, FRM strategies (prevention, reduction, residual risk), temporal scales (e.g., strategic planning, implementation/operation, and incident response), and different spatial boundaries (e.g., catchment, administrative, geographical). If there is a more diverse range of FRM interventions, as is the case in England, then there will be more opportunities to capture synergies between interventions. For example, flood defense schemes combining property level resilience (PLR) measures and utilizing early warning systems can more cost-effectively manage flood risk, as shown in the Leeds flood alleviation scheme (FAS). Additionally, FRM projects were found to support the delivery of wider objectives, for example, the Leeds FAS that helped to unlock economic growth and jobs. Furthermore, in Cumbria building a flood storage reservoir along with a nature reserve area as part of the Thaka Beck FAS helped to unlock additional environmental and amenity benefits. Interviews with sector-specific actors identified opportunities to unlock additional benefits for FRM from sector-specific interventions. For the infrastructure sector, the A14 road improvement project led by Highways England, funded PLR measures for households along the route through their Legacy Fund. Furthermore, catchment-sensitive farming approaches and river restoration projects were found to be useful interventions to reduce siltation and increase storage capacity of the river, thus reducing flood risk.

The next indicator relates to addressing the trade-offs (and negative side-effects) between different FRM and sector-specific interventions. If one intervention is implemented it may mean

that something else cannot be achieved, i.e., trade-off, or that there is an unintended consequence, i.e., negative environmental, social, or economic side effects. Compensatory or counterbalancing interventions may be required to manage any increases in risk or reduce the consequences. Similar to the synergies, these need to be managed across sources of flood risk, FRM strategies, temporal scales, and spatial boundaries, depending on the integration challenge. FRM interventions will need to mitigate or compensate any negative side effects with other sectors, e.g., by including a fish pass and replanting of trees cut down as part of a flood scheme, as identified in the Leeds FAS. Additionally, any sector-specific projects, such as road improvements, will need to mitigate any risk increase they might cause to neighboring homes, e.g., from increased highway runoff or a new bridge crossing the river at a critical point, as identified in the A14 road improvement project in England. Large housing and transport development projects need to be carefully planned to ensure they do not increase flood risk. For example, the Cambridge-Oxford Arc project aiming to deliver 1 million homes and transport improvements (East-West railway and Cambridge-Oxford Expressway) is constrained by large proportions of environmentally protected and/or flood prone land (MHCLG 2019).

The final indicator identified is the time and cost (in)efficiencies that actors can gain or lose from working together to implement interventions in an integrated way. These were found to range from cost savings such as closing a road for multiple purposes, or larger cost savings reducing the overall cost of the intervention from using the same contractors and consultants to implement the interventions. Other savings identified included sharing of maintenance or a reduction in the staff cost of developing a business case because another actor takes the lead. However, the transaction costs, e.g., time spent at meetings or money spent doing integrated assessments, can also result in inefficiencies, but interviewees agreed that these are likely to pay off in the long run.

IDENTIFYING THE DEGREE OF INTEGRATION

The assessment framework explained how each of the elements of integration can be assessed, next we identify four degrees of integration: high, intermediate, low, and minimal. Overall, characterizing these degrees of integration aims to demonstrate the varied nature through which integration can evolve and the potential movement between different degrees of integration by addressing different elements. Table 1 details each degree of integration by explaining the status of each of the elements for the governance capacity and realization of integration. These were distinguished by building upon the evidence collected on each of the elements for FRM in England and utilizing examples of stronger and weaker parts of each element as described by the interviewees. Each degree of integration is described herein and how it relates to each element and the associated indicators.

High integration is expected to have strong relationships between actors (bridging, bonding, and linking) with positively influencing actor-, rule-, and resource-based mechanisms in place that are continuously being tested and improved. There is strong presence of joint knowledge that is used to influence other elements of integration. FRM and sector-specific policies have strong alignment and new joint policies available where necessary. Multiple benefits, managed trade-offs, and maximized efficiencies

are gained across most FRM and sector specific interventions. This degree of integration was distinguished through the research because it represents the direction that many FRM actors in England identified as striving toward, a situation where they could systematically align objectives and policies to deliver multiple benefits without any mechanisms acting as significant barriers.

Intermediate integration is expected to have strong to moderate bonding relationships with good communication and aligned mind-sets but there is room to improve the moderate bridging and linking relationships. The implementation of actor-, rule-, and resource-based mechanisms are expected to improve actors' ability to work toward integration, but some mechanisms still negatively influence their ability to realize integration in practice, e.g., funding "strings," limited participation in partnerships. Knowledge is jointly developed by actors and used as an evidence base to influence policies and interventions. FRM policies are expected to have strong alignment (objectives, interventions, time lines) but opportunities remain to improve alignment with sector-specific policies. Some FRM and sector-specific interventions are expected to deliver multiple benefits, manage trade-offs, and gain efficiencies; however, it is not yet business as usual. The previous discussion assessing the elements of integration justify how FRM in England can be generally characterized at this degree of integration. Unfortunately, it is not possible within the limits of the paper to do a more detailed assessment of more specific integration challenges for FRM in England.

Low integration is expected to have moderate bonding relationships and weak to moderate bridging and linking relationships, where perspectives are starting to align. This degree of integration is expected to have some positive and negatively influencing mechanisms available but require adjustment to better support integration. Some presence of joint knowledge is expected but with limited use to influence other elements of integration. FRM policies are expected to have moderate alignment compared to weak alignment with sector-specific policies. FRM interventions are expected to focus on efficiency gains for "easy wins" and to manage critical trade-offs but only minor testing of multibenefit interventions across sectors. Insights into this degree of integration were identified from the interviews and observation at meetings where FRM actors discussed how they evolved into working more closely with partners to realize integration through the implementation of the various mechanisms, including those in the Flood and Water Management Act (UK Government 2010). When considering FRM in England, this can be considered the baseline degree of integration through which a higher degree was subsequently achieved.

Minimal integration is expected to have weak bridging and linking relationships where actors have competing perspectives and insufficient or poor quality mechanisms to enable interaction. Bonding relationships are expected to be moderate to weak as actors have low levels of interaction. However, weak alignment is expected within FRM and sector-specific policies and attempts to integrate FRM and sector-specific interventions are expected to be unsuccessful, time-consuming, and costly. This degree of integration was distinguished based on insights into the poor examples of integration provided from interviewees. Some interviewees discussed how they did not want to "go backwards"

Table 1. Assessment table for identifying the degree of integration.

Degree of integration	Governance Capacity for Integration		Realization of Integration		
	Actor relationships	Influencing mechanisms	Knowledge	Policies	Interventions
High integration	Strong bonding, bridging and linking relationships. Shared mind-set (proactive organizational culture, willingness to work together, and understanding of interdependencies). High communication intensity (very frequent, effective two-way interaction).	(+) Actor-based mechanisms in place and effective (diverse actors involved, benefits outweigh costs, resourced proactive staff). (+) Sufficient rules in place and enforced. (+) Variety of funding mechanisms accessible.	Strong presence of knowledge (e.g., assessments, studies, datasets), developed by and shared across a variety of actors, and used to influence other elements (policies, interventions, mechanisms, and relationships).	Some new joint plans exist. Strong alignment between different flood risk management (FRM) plans (sources flood risk, temporal scale, spatial boundaries). Strong alignment between FRM and sector-specific plans (objectives, joint interventions, time lines, boundaries).	Strong integration between FRM interventions and most sector-specific interventions. Systematically capture multiple benefits, manage trade-offs, and gain efficiencies.
Intermediate integration	Strong-moderate bonding, and moderate bridging and linking relationships. Mostly shared mind-sets (general willingness to work together and manage interdependencies but some barriers exist). Increasing communication intensity (frequency and effectiveness improving).	(+) Actor-based mechanisms in place but all not fully effective (e.g., poor diversity of actors, insufficient staff). (+/-) Rules available but some are not well designed or enforced. (+/-) Some joint-funding available but some limitations and “strings” attached when accessing wider (sector) funding. (-/+) Some actor-based mechanisms in place (e.g., focal points, meetings) with varied effectiveness. (+/-) Some rules present but often poorly designed or enforced. (+/-) Some funding mechanisms but no joint-funding and difficult to combine funding sources.	Strong to moderate presence of knowledge (e.g., assessments, studies, datasets), most developed by and shared across a variety of actors, and used to influence other elements.	Some new joint plans exist. Strong-moderate alignment between different FRM plans (sources flood risk, temporal scale, spatial boundaries). Moderate alignment between FRM plans and some sector-specific plans (objectives, interventions, time lines, boundaries).	Moderate to strong integration between FRM interventions and moderate with sector-specific interventions. Some FRM interventions capture multiple benefits and manage trade-offs (on project basis). Cost/time efficiencies gained across FRM and sector-specific interventions.
Low integration	Moderate bonding, and moderate to weak bridging and linking relationships. Mind-sets starting to align (willingness is growing, understanding of importance to work jointly but focus on own interests). Mixed communication intensity (varied frequency and quality).	(-/+) Some actor-based mechanisms in place (e.g., focal points, meetings) with varied effectiveness. (+/-) Some rules present but often poorly designed or enforced. (+/-) Some funding mechanisms but no joint-funding and difficult to combine funding sources.	Moderate presence of knowledge (e.g., assessments, studies, datasets), some developed jointly by a variety of actors but often not shared, and limited use to influence other elements.	No joint plans. Moderate alignment between different FRM plans (sources flood risk, temporal scale, spatial boundaries) but some FRM plans may not exist. Moderate to weak alignment between different FRM plans and sector-specific plans.	Moderate integration between FRM interventions and moderate to weak with sector-specific interventions. Piloting multibenefit interventions. Most trade-offs managed. Efficiencies delivered for “easy wins.”
Minimal integration	Moderate to weak bonding, and weak bridging and linking relationships. Different mind-sets (siload organizational culture, poor willingness to work together: “someone else’s problem”). Poor communication intensity (low frequency and only one-way).	(-/+) Only basic actor-based mechanisms in place (e.g., conferences, bilateral meetings) but poor effectiveness. (-) Some rules present but poorly designed and enforced. (-) Poor availability of funding mechanisms.	Moderate to weak presence of knowledge, mostly not developed jointly, shared across actors, or effectively used to influence other elements.	No joint plans. Weak alignment of different FRM plans and/or lack of availability. Weak alignment between FRM and sector-specific plans.	Weak integration of FRM and sector-specific interventions. No multiple benefits captured. Conflicts/negative side-effects not managed. Inefficient implementation.

to situations in the past where the key FRM actors did not have a shared understanding of FRM, limited interaction, and conflicts were prolonged in projects. For example, the relationship between the EA and IDBs was identified as having significantly improved through increased communication, organizational leadership and availability of positively influencing rule-based mechanisms, e.g., public sector cooperation agreements.

APPLICABILITY OF THE FRAMEWORK

This framework offers an approach to assess the governance capacity and realization of integration for a specific challenge,

and to identify the degree of integration. The framework can be used in different ways. It can be used to identify the overall degree of integration by understanding each element’s contribution and their interaction with one another. Additionally, it can be used for a more detailed assessment of the strength of a specific element using the identified indicators and then to reflect back on the influence with other elements.

Another positive feature of the framework is the ability to pinpoint elements that can be improved to reach a higher degree of integration. This can be useful if improvements are planned

for a specific element, to identify how other elements could additionally be improved. In particular, the focus on improving integration is often on developing plans or implementing projects, but using the framework can help to ensure that the governance capacity for integration is also addressed or that its influences are considered when approaching the integration improvements. For example, an intervention, such as an EA-led flood scheme, transport scheme, or NFM scheme, can be assessed to understand its influence on the development of relationships and if any mechanisms supported or hindered its ability to reach a high degree of integration. On the other hand, improvements may focus on improving the capacity for integration through building relationships or improving mechanisms, and the framework helps bring to the forefront the interconnectivity between this and the realization of integration in practice, for example, how relationships between developers, planning authorities, and LLFAs, are enabling or hindering the realization of integration through the delivery of risk-informed housing developments.

The framework is flexible in that it can be used for a range of different integration challenges within FRM, which may evolve in stages depending on interests and priorities. The degree of integration can be assessed between different FRM strategies, sources of flood risk, and at different spatial boundaries, e.g., administrative, catchment, or geographical. It can specifically assess integration between FRM and other sectors, such as agriculture or emergency response. Additionally, the framework could be applied to assess past, current, or future scenarios of integration challenges. Although the framework was developed based on evidence from FRM in England, it is expected that it can be applied to other countries and their associated flood risk governance contexts. Although the integration challenges may vary from one country to another, it is expected that the elements and associated indicators will still be applicable. However, the appropriateness of some mechanisms are likely to vary. Furthermore, given the varied nature of integration challenges across different countries and their FRM governance contexts, we are apprehensive to use the framework to directly compare integration across countries because these could be misinterpreted. Nevertheless, we still recommend comparisons but only with a clear statement of the integration context. It is anticipated that the framework could also be used for integration challenges wider than FRM (or for other wicked problems), however the framework would need some adjustments and testing to do so.

CONCLUSIONS

The nature of managing flood risk across multiple policy and implementation settings is complex, whereby some degree of integration is necessary to enable better outcomes for flood risk management (FRM) and sector-specific goals. We propose a framework for assessing integration in FRM, as developed on the basis of a literature review and supported by evidence on FRM in England. The framework specifies the importance of identifying the integration challenge, assessing the governance capacity for integration, through the strength of actor relationships and influencing mechanisms, and the realization of integration through knowledge, policies, and interventions. The framework comprises a simple assessment table to identify the degree of integration (high, intermediate, low, or minimal) for a specific integration challenge. The framework offers flexibility,

and it can be applied simply to get a general positioning of the degree of integration, but also in-depth to assess specific elements and to establish how they interact with others. The framework can be used to assess multiple integration challenges within FRM, e.g., across specific sectors, spatial boundaries, or FRM strategies.

The framework emphasizes the interconnectedness between two dimensions of integration: building governance capacity for integration and realizing integration in practice. The governance capacity for integration demonstrates the importance of building strong relationships between key FRM actors (bonding), sector-specific actors (bridging), and communities (linking), and understanding the positive and/or negative influence of actor-, rule-, and resource-based mechanisms. Realizing integration in practice is approached from FRM and sector-specific perspectives, with the aim to reduce conflicts across sectors and fully maximize opportunities for synergies. Furthermore, the research on FRM in England showed that working toward integration is an evolving process where stepwise changes to different dimensions and elements are expected over time rather than any “quick fixes.”

The framework provides theoretical progression on the concept of integration and how it can be assessed. Further research on the framework is recommended to test detailed applications for different geographical and flood risk governance contexts. Such research can help to understand the interactions and influences between elements of the capacity and realization of integration, and help to better characterize the different degrees of integration. Additionally, the influence of other external factors on integration should be explored, such as flood events and socioeconomic conditions. Ultimately, such an assessment of integration should help researchers, policy makers, and practitioners work toward an improved degree of integration in FRM.

Responses to this article can be read online at:

<http://www.ecologyandsociety.org/issues/responses.php/11298>

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Appendix K Key actor roles in Serbia for flood risk management

National Level Actors (some also have local representation)

Actor	Role and Responsibilities
Republic Hydro-meteorological Service of Serbia (RMHSS)	Since 2003, the core responsibility for observations, forecasts, and warnings of extreme meteorological and hydrological events resides with the Republic Hydro-meteorological Service of Serbia (RMHSS). They are a national institute not part of any Ministry. They produce information for 1 st level rivers on the current water levels and forecasts with 2 days lead time for the Sava and Danube. For 2 nd level rivers they produce information on the water level trend – going up or down. They have 50 automatic rain gauges and 198 water level gauges (120 automatic). Their forecasts are produced for regions. It does indicate a warning level based on the response plan – yellow, orange or green (based on MeteoAlarm).
Sector for Emergency Management (Ministry of the Interior)	Within the Ministry of Interior, the Sector for Emergency Management (SEM) is the leading departmental entity which is organized along four key areas: prevention, fire and rescue, risk management, and civil protection. In 2009, with the introduction of the Law on Emergency Situations, SEM was recognized as a single body within the Ministry of Interior where all emergency services from MOI, Ministry of Defence and Ministry of Environment are integrated. Since 2011, the Ministry of Interior is leading the National Emergency Management Headquarters (NEMH). Their role is to coordinate activities and measures included in the Serbian National Strategy for Protection and Rescue in Emergencies. SEM led the preparation of the National Risk Assessment and approved all the local risk assessment documentation. They have national and regional Information Centres (RCO) which are responsible to communicate all information to ministries and other actors. They prepare a bulletin including data from RHMSS. SEM has regional representation which support monitoring of the Local or City Emergency Management Headquarters activities and department of Civil Protection, City Administration. For Kraljevo, the regional representation is situated in Kraljevo City Administration but serves the wider region (Raska district). SEMs main role regionally is the fire service. They have specialised units for civil protection e.g. rescue. They have a role to monitor and inspect the municipality led Civil Protection Department.
The Directorate for Water (DW) (Ministry of Agriculture, Forestry and Water)	The Directorate for Water (DW) under the Ministry of Agriculture, Forestry and Water combines the responsibility for water resource management and floods protection on first level water courses, drainage, water supply and sanitation services. Under the Water Law, the water directorate is responsible for the three steps of flood analysis: Preliminary flood risk assessment for each river basin Flood mapping including flood hazard maps and flood risk maps Floods risk management plans, to be completed by 2015. The water directorate is also responsible for the flood risk assessment and for preparation of the national plan for floods protection (each 5 years), as well as the annual plans in collaboration with other stakeholders. However, they are not involved in any implementation or operational activities, all of which is done by the Public Water Companies.
Public Water Companies	There are two water companies (PWCs) under the Ministry of Agriculture Forestry and Water – Srbijavode PWC (Serbia Water) and Vode Vojvodine PWC– are responsible for

(Ministry of Agriculture, Forestry and Water)	a wide variety of tasks, including operational management of water infrastructure, distribution of water to users, licensing of water resources, as well as hydrological monitoring and floods protection and dams and reservoirs. Serbia Water have two regional Water Management Centres, one for the West Morava and another for Danube and Sava, along with four local offices. They have 2-3 people situated in Cacak (30km upstream from Kraljevo).
National Public Utility Companies	National Roads responsible for state roads Electric Serbia Serbian Rail Telecom Serbia (private)
Programme Investment Management Office (PIMO)	The Public Investment Management Office is a new body of the Government of the Republic of Serbia tasked with managing the projects of reconstruction and aid allocation following natural and other hazards, but primarily the projects of reconstruction of thousands of preschools, school, health care and social protection establishments.
Red Cross Serbia	Their main responsibility is in the early response (e.g. evacuation, search and rescue, provision of shelter, food and blankets) and immediate recovery phase (e.g. mud pumps, dehumidifiers, repair kits). Recently (last 3 years) they are also involved in supporting preparedness activities e.g. education on how what to do in an event. The Red Cross has representation nationally and locally with professionals and volunteers. There are different teams within the red cross offices e.g. food response, mobile technical team, logistics team.
Other Ministries	Ministry of Defence – Army Ministry of Environmental Protection Ministry of Local Administration and Self Government Ministry of Health
Other national institutions	<ul style="list-style-type: none"> - RGZ – Royal Geodetic Institute - SEPA - Agency for monitoring water quality - Public Health Institute - Veterinarian Specialist Institute - Serbia Forest
Donors	<ul style="list-style-type: none"> - World Bank - United Nations Development Programme - European Union
Associations	<ul style="list-style-type: none"> - Standing Conference on Towns and Municipalities
Media	<ul style="list-style-type: none"> - Local, national and international broadcast media provide information to the public when an event is happening.

Local level actors (in Kraljevo)

Actor	Role and Responsibilities
Department of Civil Protection, City of Kraljevo	The department was established in 2010 after the introduction of the Law on Emergency Situations (2009, update 2012). The main functions are: implementing measures for preparedness; organization of protection against natural and man-made disasters, as well as in rescue, relief and recovery; adoption of plans and programs for emergency situations; educating and training staff for emergency situations; forming and equipping units for civil protection; classifying and identifying damage to the buildings in case of disasters. They are responsible for completing the local risk assessment, damage assessment and Post Disaster Needs Assessment. Team members are part of the expert

	<p>team (SOT) for City Emergency Headquarters to provide evidence to inform decisions e.g. to evacuate or declare an emergency.</p> <p>Water and floods management on 2nd level water courses are the responsibility of municipalities under their administration. In Kraljevo the Civil Protection department take this responsibility but coordinate with the public firm on Urban Landscaping who complete maintenance and deliver new assets. They developed and maintain the Local Operational Flood Plan Kraljevo (approved by city parliament).</p>
City Administration (local)	<p>City Administration includes the City Mayor (Deputy and Assistant), the City Council and the City Assembly. It also includes the municipal police. The Mayor acts as the head of the Municipal Emergency Headquarters. Three City Council members are appointed to the City Emergency Headquarter and can be asked to act as ‘Sector Leaders’ to coordinate response and recovery to an event at the local level and help to identify the priority areas for the mayor and director of urban landscaping.</p>
Other municipal departments	<ul style="list-style-type: none"> - Planning Department - Cleaning Department - Social services Department
Urban Landscaping public company	<p>This public company is responsible to plan, deliver and monitor infrastructure in the area including roads, level 2 river/ flood infrastructure, business parks, sports facilities. This does not include housing. They collect and utilise available risk information to inform the infrastructure planning.</p> <p>The director acts as the chief (flood) defence officer and is responsible to coordinate the implementation of the local Operational Flood Plan to direct public utility companies to take action and coordinate with Serbia Water. They also support damage data collection on infrastructure during and after events.</p>
Local Public Utility Companies	<p>There are additional local public utility companies responsible for roads (Putevi) and for drinking water and waste water (Vodovod) and cleansing. Some will have sandbags and other equipment that they use during an event to support preparedness and response efforts.</p>
Contractors	<p>Specialised contractors are used to implement flood defence works for Serbia water and public company Urban Landscaping (as they have no equipment). Other public utility companies will use different contractors to complete their work e.g. on roads or water distribution.</p>
Civil Protection Commissioners	<p>The DCP trains Civil Protection Commissioners (CPCs) and provides them with uniforms and basic equipment e.g. water tanks, brushes. In Kraljevo, there are Focal points and Deputy Focal Point Civil Protection Commissioners (approx. 151 people) and then there are volunteers which form the General Purpose Units (GPU) (100 people). They can be volunteers from the community and from public utility companies. The GPUs focus on easier tasks like helping in evacuation, or filling sandbags.</p>
Community Council Members	<p>The members of community councils are volunteers at the local level, and they act as important points of contact for the Civil Protection Commissioners. There are 68 communities in Kraljevo municipality.</p>
NGOs	<p>Environmental NGOs are active in particular locations. They support governmental response efforts because they have good local knowledge and contacts. They are now receiving training from the DCP. They also support prevention activities e.g. cleaning rivers and education on risk.</p>